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ABSTRACT

Provided in this document are the proceedings of the 1983 annual meeting of the National Association of Academies of Sciences (NAAS), the NAAS handbook, and the NAAS directory. The proceedings also include papers presented at a symposium on the crisis in science and mathematics education, various NAAS reports, and abstracts of American Junior Academy of Science papers presented at the 1983 annual meeting of the American Association for the Advancement of Science. Symposium papers (each preceded by an abstract) are: "Federalism and its Impact on National Science Foundation (NSF) Grants and the Training of Teachers" (Ertle Thompson); "Science Crisis in Michigan: Myth or Reality" (Laurel Grotzinger); "Impact of the New Federalism at the State Level" (John McDermott), which addresses issues in Pennsylvania; "The Crisis in Science and Mathematics Education: How is Indiana Coping" (Walter Cory); "The Crisis in Science Education: A Mississippi Perspective" (Dudley Peeler); "Goals for Science Education" (Anna Harrison); and an abstract of "The Crisis in Science Education: An Overview" (F. James Rutherford). The directory lists member academies (by state), their officers, and their 1983-1984 activities. The handbook includes the NAAS constitution, by-laws, articles of incorporation, statement of NAAS purposes and activities, and other information. (JN)

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The PROCEEDINGS, DIRECTORY and HANDBOOK

of the

NATIONAL ASSOCIATION of ACADEMIES of SCIENCE

1983 - 84

SYMPOSIUM: The Crises in Science and Mathematics Education: Perspectives from the National, State, and local levels. Arranged by *George C. Shoffstall,* Past-President, NAAS, President-Elect, Pennsylvania Academy of Science. Held - 28th May, 1983 in Detroit in conjunction with the 149th National meeting of the AAAS.

Edited and Prepared by
Shyamal K. Majumdar
Secretary, NAAS

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Edited and Prepared by
Shyamal K. Majumdar, Secretary
National Association of Academies of Science
Department of Biology
Lafayette College
Easton, PA 18042
September 1983

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Affiliated with the American Association for the Advancement of Science

Dr. Lee N. Bolen, Jr.
President, NAAS

Dr. Bolen is Professor of Physics at the University of Mississippi. He is a member of the Physical Acoustics Research Group at that institution and conducts research in the areas of sound attenuation in air and outdoor sound propagation. He has served as president of the Mississippi Academy of Sciences and has worked with the Junior Academy of Science in that state.

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THE PROCEEDINGS, DIRECTORY, AND HANDBOOK OF THE NATIONAL ASSOCIATION OF ACADEMIES OF SCIENCE
1983 - 1984
TABLE OF CONTENTS

Page

Foreword: Lee N. Bolen, President, NAAS 5

National Association of Academies of Science, Board of Directors, 1983-84 6

NAAS, Committees, 1983 - 1984 7

1983 Distinguished Service Award to Dr. Joseph M. Dasbach 8

Distinguished Service Awards (1962- 1983) 9

Symposium: The Crises in Science and Mathematics Education: Perspectives from National, State, and Local Levels—Arranged and Presided by George C. Shoffstall

Introduction - George C. Shoffstall, West Penn Hospital, Pittsburgh, PA 11

Federalism and Its Impact on NSF Grants and the Training of Teachers. Ertle Thompson, Univ. of Va., Charlottesville, VA 12

Science Crisis in Michigan: Myth or Reality. Laurel A. Grotzinger, West Mich. Univ., Kalamazoo, MI 17

Impact of the New Federalism in Pennsylvania. John J. McDermott, Dept. of Educ., Harrisburg, PA 26

The Crisis in Science and Mathematics Education: How Indiana is Coping. Walter Cory, Ind. Univ., Bloomington, IN 31

The Crisis in Science Education: A Mississippi Perspective. Dudley F. Peeler, Jr., Univ. of Miss., Jackson, MS 38

Goals for Science Education. Anna J. Harrison, President-Elect, AAAS, Mount Holyoke College, South Hadley, MA 45

The Crisis in Science Education: An Overview. (Abstract only). F. James Rutherford, Chief Education Officer, AAAS, Washington, DC 48

Minutes, NAAS Board Meeting, May 28, 1982 49

Minutes, NAAS Executive Board Meeting, May 27, 1983 53

Minutes, Annual Meeting of the Delegates to the NAAS, May 28, 1983 61

Report of the Committee on Appropriate Roles and Strategies for Science Academies in Relation to AAAS Coalition for Education in the Sciences 65

Report on NAAS and AAAS Sponsored Book, *Science and Creation*—Edited by Robert W. Hanson 69

American Junior Academy of Science

Program - 1983 Annual Banquet ... 71
1983 AJAS Delegates ... 73
AJAS Abstracts of Papers ... 74

Directory of Member Academies and Their Activities 1983-1984*

Alabama ... 89
Arizona-Nevada ... 90
Arkansas ... 90
Chicago ... 91
Colorado-Wyoming ... 92
Florida ... 93
Georgia ... 94
Hawaii ... 94
Idaho ... 95
Illinois ... 96
Indiana ... 97
Iowa ... 98
Kansas ... 99
Kentucky ... 100
Louisiana ... 101
Maryland ... 102
Michigan ... 103
Minnesota ... 104
Mississippi ... 105
Missouri ... 106
Montana ... 108
Nebraska ... 108
New Jersey ... 110
New Mexico ... 111
New Orleans ... 112
New York City (American Institute) ... 112
North Carolina ... 113
North Dakota ... 114
Ohio ... 114
Oklahoma ... 116
Oregon ... 117
Pennsylvania ... 118
St. Louis ... 119
South Carolina ... 119
South Dakota ... 120
Southern California ... 121
Tennessee ... 122

---

*Due to various election dates among the academies, some officers may have changed by the time of the 1984 meeting.

Texas 123
Utah 124
Vermont 126
Virginia 127
Washington, D.C. 128
West Virginia 129
Wisconsin 130

Handbook

Constitution 131

By-Laws 133

Articles of Incorporation 138

Meeting Locations and Presidents NAAS 141

Message to Member Academies of Science 142

The National Association of
Academies of Science—Purpose and Activities 143

FOREWORD

The Proceedings of the National Association of Academies of Science carries an account of the annual meeting of the Association and the minutes and financial reports of the Association. The *Directory and Handbook* lists a directory of the officers of the Association, the officers and pertinent data of each member academy and the constitution by-laws, and articles of incorporation of the association.

This year's Proceedings includes the abstracts and papers from the NAAS/AAAS Symposium which was presented May 28 at the AAAS meeting in Detroit entitled: "The Crises in Science and Mathematics Education: Perspectives from the National, State, and Local Levels." Also included are abstracts of all the American Junior Academy of Science papers presented at the AAAS meeting. Because the AAAS meeting is held in May and our proceedings follow that meeting, it was appropriate to combine the *Proceedings* and *Directory* of NAAS and state academy officers in order that they would be available to state academies in early fall.

The primary purpose of the NAAS is to provide an organization for the promotion of the common aims of the various Academies and of the American Association for the Advancement of Science. For this reason the AAAS provides substantial assistance and support for our activities.

The second purpose of the NAAS is to aid all member academies in their common purposes and accomplishments. Toward this end an annual meeting is held (in conjunction with the AAAS convention) at which delegates from the member academies participate in a day-long program of activities involving subjects of concern to academies of science. In addition, The board of Directors of the NAAS and the committee members work throughout the year on matters that are supportive of the member academies - planning the program for the annual meeting, including the program of the American Junior Academy of Science, mailings to the officers of the member academies including newsletters, meeting with AAAS representatives to discusss and plan cooperative activities such as youth activities in science, and setting up the booth at the AAAS convention. Putting together the *Directory and Handbook* and the *Proceedings* each year is a major effort. Assisting member academies with their publication problems was the goal of several workshops for editors of academy publications.

During the academic year all member academies will receive a series of NAAS newsletters from the president. You are invited to send suggestions or requests to the NAAS President at the address in the Directory. The NAAS Board of Directors wish to consider activities which will be supportive of member academies and solicit your input and participation.

Lee N. Bolen, Jr.
President, NAAS
July, 1983

National Association of Academies of Science

BOARD OF DIRECTORS, 1983-84

President: Dr. Lee N. Bolen, Physics Department, University of Mississippi, University, MS 38677. (601) 232-5401 (office); (601) 234-6134 (home).

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Director, AJAS: Mrs. Dallas W. Cocke, The Collegiate Schools, N. Mooreland Road, Richmond, VA 23229. (804) 740-7077 (office); (804) 282-5719 (home).

Delegates to AAAS Council: Dr. Robert W. Hanson, Department of Chemistry, University of Northern Iowa, Cedar Falls, IA 50613. (319) 273-2022 (office); (319) 266-8245 (home).

Dr. George C. Shoffstall, West Penn Hospital, 4800 Friendship Ave., Pittsburgh, PA 15224. (412) 578-6884 (office); (412) 441-0455 (home).

AAAS Representatives: Dr. Joseph M. Dasbach, Office of Science Education, AAAS, 1776 Massachusetts Avenue, NW, Washington, DC 20036. (202) 467-4464 (office).

NAAS COMMITTEES
(1983 - 84)

Junior Academy

Ms. Dallas Cocke, Richmond, VA (Chair)
Sister Mary Alvernia Groszek, Lamont, IL
Mr. Paul Sullivan, Brooklyn, NY
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Dr. William C. Schmitt, Columbus, OH
Dr. Lee Bolen, University, MS (Ex-officio)

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Dr. Lee Bolen, President NAAS (1985) (Ex-officio)
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Publication* and NAAS Representative to the AAAS Steering Committee: *Coalition for Education in Sciences

Mr. Lynn E. Elfner, Archivist, NAAS, Ohio Academy of Sciences, Columbus, OH

Recognition and Awards

Mr. Lynn E. Elfner, Columbus, OH (Chair)
Dr. George C. Shoffstall, Pittsburgh, PA
Dr. Joe Dasbach, AAAS Office, Washington, D.C.

DISTINGUISHED SERVICE AWARD, 1983
DR. JOSEPH M. DASBACH

Joseph M. Dasbach, Project Director, AAAS Office of Science and Technology Education, has been a representative of the AAAS on the Board of Directors of the National Association of Academies of Science since 1976. From 1967-71 he was part of the team at the AAAS which developed the elementary science curriculum, *Science—A Process Approach.*

He spent the period from 1971-74 on the staff at the *Regional Center for Education in Science and Mathematics* in Penang, Malaysia, a center which provided courses, conferences, and workshops in precollege science and mathematics for key educators from eight Southeast Asian countries.

Upon his return to AAAS he has been active in the Chautauqua Short Courses for College Teachers, the NAAS, "Science Encounters" at the AAAS Annual Meeting, *Science Education News,* and *Science Resources for Schools.*

In recognition of these many achievements, the National Association of Academies of Science presents the DISTINGUISHED SERVICE AWARD OF 1983 to you, Dr. Dasbach, for your leadership and service to Science at the local, state, national and international levels.

DISTINGUISHED SERVICE AWARDS
(1962 - 1983)

1962	Dr. Leland H. Taylor (W. VA) Dr. Patrick H. Yancey (AL)
1963	Dr. Clinton L. Baker (TN.) Dr. Wayne Taylor (MI)
1964	E. Ruffin Jones (FL) John A. Yarbrough (NC)
1965	J. Teague Self (OK) G. Gerald Acker (OH)
1966	Karlem Riess (New Orleans)
1967	Dr. James A. Rutledge (NB) (Raymond L. Taylor [AAAS], not mentioned in the Distinguished Address but mentioned in subsequent lists in the D&P as having received the award).
1968	John H. Melvin (OH) Dr. John G. Arnold, Jr. (New Orleans) V. Elving Anderson (MN)
1969	Harry Bennet (LA)
1970	Dr. John R. Mayor (AAAS)
1971	Dr. Rodney C. Berry (VA) Dr. Everett L. Wisman (VA) Dr. Wilmer W. Tanner (UT)
1972	Thelma C. Heatwole (AAAS) Glenn W. Stewart (NH) Stella Catherine Miller (Washington, D.C.)
1974	Hans Nussbaum (AAAS) Charles M. Vaughn (OH) Charles E. DePoe (LA)
1975	Lora Mangum Shields (NM) Frank Starr (IA) Franz H. Rathmann (ND)
1976	Richard J. Raridon (TN)
1977	Boyd Harshbarger (VA) Robert C. Miller (CA)
1978	Albert McCombs (CO) Sister M. Gabrielle Maze (PA)

1979	Ruth (John) Melvin (OH) Robert W. Hanson (IA)
1980	James Batt (WI) George C. Shoffstall (PA)
1981	Lynn E. Elfner (OH)
1982	Arthur H. Livermore (AAAS)
1983	Joseph M. Dasbach (AAAS)

SYMPOSIUM*

THE CRISES IN SCIENCE AND MATHEMATICS EDUCATION: PERSPECTIVES FROM NATIONAL, STATE, AND LOCAL LEVELS — May 28, 1983, AAAS 149th National Meeting, Detroit, Michigan.

Arranged and presided by **George C. Shoffstall** *(Pres.-Elect, Pennsylvania Academy of Science and Past President, Natl. Assn. of Academies of Science; Dir., Education and Organization Development, West Penn Hosp., Pittsburgh, Pa. 15224).*

INTRODUCTION

GEORGE C. SHOFFSTALL
Symposium Chairman
West Penn Hospital
Pittsburgh, PA 15224

There is an escalating awareness at all levels across these United States of America concerning the difficulties we are facing in our educational systems to meet the needs of society. Changes in national science policies, the new federalism, conflict situations—especially creationism versus evolution science, weaknesses in precollege mathematics and sciences, illiteracy, gaps in the science communication processes, and obsolescence in university and secondary school laboratory equipment have all been focal points for current discussions on the crises in science, mathematics, and engineering education in these United States. Hence, it is imperative to critically review the antecedents and consequences of the aforementioned changes. The papers presented in this session by a broad spectrum of speakers will discuss some of the modifications necessary to ameliorate these changes and the conditions under which they are relevant. The implications of this symposium "The Crises in Science and Mathematics Education: Perspectives from the Natinoal, State, and Local Levels" are axiomatic. Moreover, particular attention will be given to science education at the grassroots level and how to state academies of science can continue to have an impact on this issue. Audience discussion is scheduled in interaction with the panel of speakers.

***Sponsor:** National Association of Academies of Science.

Cosponsors: AAAS Section Q; AAAS Office of Science and Technology Education.

Note: The abstract portion of each symposium paper was reprinted from AAAS *Abstracts of Papers* of the 149th National Meeting, 26-31 May, 1983—Detroit, Michigan.

The NAAS/AAAS Symposium: The Crises in Science and Mathematics Education, 1983.

FEDERALISM AND ITS IMPACT ON NSF GRANTS AND THE TRAINING OF TEACHERS

ERTLE THOMPSON

Treasurer, National Association of Academies of Science
Professor of Science Education
Ruffner Hall
Charlottesville, Virginia 22903

ABSTRACT

The greatest challenge for science and mathematics education in the '80's is the establishment of realistic goals for developing a scientifically literate society, and the preparation and enhancement of the talent pool for the research and development, and the technological support essential for human welfare in a world increasingly dependent on science and technology. Recent studies and surveys indicate declining knowledge and interest in science and mathematics among pre-college students; yet, the federal government and, in many cases, state governments have abandoned the aggressive efforts of the post-Sputnik era to improve the quality of science and mathematics education. Teacher preparation suffers in both quality and quantity. Science and mathematics education centers are being devastated by retrenchment policies. Instructional materials and supplies are inadequate. Teachers are leaving the classroom for more financially rewarding careers. In-service-continuing education opportunities to upgrade teacher knowledge and keep teachers alive professionally have been drastically reduced. Our challenge is to modify the policies and practices responsible for the present status, so that science, mathematics and technological education for the '80's will be strengthened.

This paper is dedicated to the thousands of science teachers who daily perform the task of teaching the youth of this country in high quality programs in science education. Despite the continuing criticisms in the news media and public meetings, and inadequate support, they continue to produce from among our top students the best scientific talent in the world.

INTRODUCTION AND OVERVIEW

The annals of science education literature are replete with yearbooks and commission studies analyzing and delineating the problems of science education for the past hundred years. The collection in my office currently occupies 12 linear feet of shelf space. All of you present today are familiar with most of the yearbook and commission studies published during the past two decades; therefore, it is the choice of the writer not to bore you with the redundancy of the commission findings and recommendations. The writer would, however, like to emphasize the tremendous change that has come about in American education since the publication of the Committee of Ten Report in 1893, which recommended a highly content structured program of preparation in science for the 8 to 11 percent of the 14-17 year old school population who attended secondary schools at that time. These recommendations were made despite the fact that only 2 percent of the eligible school age population actually graduated from high school. These data need to be compared and contrasted with the recommendations concerning the curriculum development and implementation of the 60's and 70's when 90 percent of the school age population were in school and 75 percent of the eligible population graduated from high school. Obviously, the demands on the schools and upon the teachers of specialized areas, such as science and mathematics, are much more diverse in the 1980's than the 1890's. Yet one could easily deduce, from recent recommendations for a return to the rigors of the past, that many feel the academic program recommended by the Committee of Ten would suit the youth of today.

CHANGING ORGANIZATIONAL PATTERNS OF SCHOOLS AND CONFLICTING DEMANDS OF THE PUBLIC

It is probably safe to assert that no other educational system in the world has attempted to do as much for so many as we have in the 50 states of this great nation. By attempting to educate all of the children of all of the people we have increasingly placed our teachers in situations requiring them to teach not only the content of the academic discipline in which they should be prepared, but to deal with an ever increasing number of social issues from a complex and ever changing society. The awareness of social injustices of the past and the desire to solve the problems and injustices created by discriminatory actions have also increased demands on teacher's time and commitment. In the midst of this school climate, and increasing awareness of the need for protection of individual student rights and freedom, classroom standards for control and self-discipline became very much confused. Standards for student performance deteriorated. The public cry for accountability sounded louder and louder until "Back to Basics" became the marching theme from coast to coast.

Problems—Challenges—Crises?

Several important areas to be discussed in the remaining section of this paper deal with the problems and challenges confronting the science education community, which if not attended to will certainly become crises.

Goals for Science Education

We need to address ourselves, in the science education community, to agree upon two realistic and attainable goals. (1) The teaching of science for development of the scientific talent in the academic disciplines for future careers in science, mathemtics, engineering, and technology and (2) a commitment to the development of scientific literacy in the total population, for fuller understanding and enjoyment of the world of nature and technology, and wiser decision making regarding the problems of daily living in the technological society of today and tomorrow.

The curriculum development efforts post-Sputnik under the support of the National Science Foundation funding, and quality control by specialists and teachers, had the most significant impact of any other individual effort in the history of American education. Despite much data accumulated in the national surveys showing that the curriculum projects fell short of their stated goals, it certainly cannot be argued that the curriculum projects failed to infuse the schools K-12 with up-to-date science content. In retrospect, many of the courses and programs may have been overly structured in terms of the academic discipline at the expense of eliminating most or all of the technology, which for many provided the interest and motivation for the study of the applications of science. The major failures of the curriculum project movement of the 60's and 70's can be categorized as the implementation activities, or lack thereof. The curriculum development and implementation phases were not buttressed by teacher preparation programs, conducted by knowledgeable, enthusiastic, dedicated individuals. This is not to say that the support for summer institutes, academic year institutes, and in-service teacher preparation programs was inadequate, but simply to assert that because of the lack of coordianation, the left hand did not know what the right hand was doing, and the teacher preparation activities, in many cases, provided negative support for the curriculum development products and implementation efforts.

Support Mechanisms

A continuing, perplexing problem of American education is the lack of clearly defined roles for the federal, state, and local governments in the financial support of education. The disparity among the financial bases of local communities at the state level and among states at the national level means that a local community within a state may expend a tenfold effort when compared to another local community within the state and still provide inadequate financial support for needed educational services. The same is true when the poorest state is compared to the wealthiest state in terms of tax base and effort. Such inequities must be addressed individually by the states and also by the federal government.

During the post-World War II era, communities provided the financial support for the construction of school facilities unequalled in our history. However, with increasing inflation, the rising cost of living and higher taxes the public revolt of the late 70's left public education at the mercies of supercritical and unsupportive electorates. Teachers were expected to perform miracles in instructional programs with science, where the total equipment and instructional supplies budget per pupil annually was less than the cost of a ticket, with refreshments, for a NFL football game. Teachers' salaries were inadequate and the annual increases were zero to a fractional part of the inflation rate.

The Abdication of Responsibility for Teacher Preparation

In the mid-50's and the post-Sputnik era science education in America, and internationally, witnessed a great resurgence of cooperative efforts on the part of scientists, engineers, technicians, and educators under the auspices of National Science Foundation support. College and university professors in all of the major disciplines of science devoted themselves to special programs for teacher preparation, the undergraduate and graduate continuing education. However, with much of the conflict surrounding concerns for social issues in the 70's and the decline in federal financial support for science and mathematics education activities most of the academic scholars retreated to their research laboratories, where they could be safe from public ridicule, and more secure in the financial support of continuing research grants.

Much of the preceding discussion is too negative, and too candid an indictment of the scientific and education communities of this country. However, if we are to solve the problems of the future we must be willing to share the responsibilities for our individual actions and the blame for our failures as readily as we are willing to accept the accolades for our achievements when we succeed. Fortunately there are many positive indicators which should serve as guides in the search for solutions to our current problems. The public seems receptive to massive changes in educational programs. The states are redefining standards for instructional programs, and mathematics and science requirements are being increased nationwide. Departments of teacher certification are establishing higher standards for the certification of science teachers. Colleges and universities are making concerted efforts to enroll more teachers in undergraduate programs leading to certification in the sciences and mathematics.

The challenge remains, from the White House and the Halls of Congress to the local school board and the principal's office, for executive, legislative, and administrative policies and financial support for excellence in instructional programs. The same is true, from the President's Science Advisor and the National Science Board to the college professor, to the local science supervisor, regarding responsibilities for establishment of professional policies and support which have academic merit and credibility. The preparation of science teachers for the future is too important and too massive an undertaking to be left to the discretion of a small cadre of science education specialists in far too limited number of colleges and universities. It must be the responsibility of the whole scientific community.

Past and Future Roles of NSF Grants and the Training of Teachers

Little has been stated explicitly, but much has been implied in the preceding sections of this paper regarding the impact of the new Federalism on NSF's participation in the training of science and mathematics teachers. However, from reading the myriad of reports and studies from the inception of the National Science Foundation to the present it is not clear that all of the reduction in NSF participation in science and mathematics education activities at the pre-college level have been due to the new Federalism. From a very meager beginning in 1952, with an expenditure of $7,000 plus for science education research and analysis the support and involvement of NSF grew to a maximum $124 million for each of the years 1966-68, and then diminished to practically zero in 1983. A graph of the expenditures during that period of time represents an almost perfect Bell curve. The support initially for teacher education in Summer Institutes, then Acade

Year Institutes, followed by Course Content Development Projects in the disciplines and implementation activities including specialized teacher training involved estimates of 50-60 percent of the mathematics and science teachers grades 7-12. During the peak period of financial support and teacher participation it is estimated that as many as 30 percent of the teachers in mathematics and science were provided the best of training, and/or continuing education in combinations of Summer Institutes, In-service Institutes, and Cooperative College School Science Programs. The role of NSF was clearly that of providing, as authorized by the National Science Foundation Act of 1950, "financial support for the scientific and educational activities and the appaisal of the impact of such activities upon the general welfare." The secondary role of NSF, unrecognized by many in the scientific community, was the establishment and maintenance of standards through the peer-review system for programs in teacher training at the graduate, and continuing education levels. The established standards directly effected positive changes in undergraduate teacher education programs. With the precipitous decline in funding of the Science Education Directorate within the National Science Foundation, beginning in 1969, the role that NSF could play, and has played in helping to establish and maintain standards of excellence in science and mathematics education at the pre-college level diminished significantly. It is the considered judgment of this writer that the future role of NSF must be to help reestablish those standards by the provision of the scholarly expertise, and serving as the major conduit of financial support for redefined and reestablished programs of excellence in science, mathematics, engineering, and technological education. To reestablish and redefine its role NSF must have the support from the new generation of young scientists, mathematicians, engineers, and teachers who constitute the membership of the scientific societies and associations, such as the National Association of Academies of Science and the American Association for the Advancement of Science. With the concerted and cooperative efforts of all such interestsed persons the declines of the past ten years can be reversed and sound programs of teacher preparation for the future can be reestablished.

The NAAS/AAAS Symposium: The Crises in Science and Mathematics Education, 1983.

SCIENCE CRISIS IN MICHIGAN: MYTH OR REALITY

LAUREL A. GROTZINGER

President, Michigan Academy of Science, Arts and Letters
Dean of The Graduate College and
Chief Research Officer
Western Michigan University
Kalamazoo, Michigan 49008

ABSTRACT

A survey of major institutions in Michigan indicates that there is a severe educational problem in this financially taxed state in the areas of mathematics and science. However, the problem can not be directly related to a loss of overall federal funding. As of January, 1983, institutions with strong basic research programs report a continuation of external funding awards well-correlated to their prior history. On the other hand, Michigan has suffered from the key reduction in Congressional fiscal support to the NSF. Science education, the foundation for the full range of scientific opportunities from the elementary classroom to the doctoral programs, is at an all-time ebb. A primary concern is the lack of actual facts about the degree of deterioration, but a number of institutions are engaged in the first stage of problem asessment. The unanswered question remains: Is there enough time to address the problem or has it passed the critical mass?

One of Mark Twain's well-known quotations seems especially apropos to the following comments since the words on the pages before me are barely out of the typewriter. For all of us who procrastinate, Mark Twain noted, "Never put off til tomorrow what you can do the day after tomorrow." Nearly a year ago, when George Shoffstall called and asked if I would participate in this panel on "The Crisis in Science and Mathematics Education," I was sensitive to the fact that this particular subject is not an area related to my own research efforts. At the same time, since I *am* involved in the higher education and research community, one would have to be deaf, dumb, and blind not to be aware that a significant problem has been identified in almost every form of publication and is uppermost in the minds of legislators, educators, and the citizenry. For example, in the *Kalamazoo Gazette* of January 1, 1983, the headlines of one article notes "Science Education Need Cited." That article succinctly stated that "legislators, education officials and Gov. James Blanchard joined today to call for increased attention to science and technology training in Michigan."[1] A month later, *Newsweek* featured an article entitled "Bait for Science Teachers" which noted that "officially, 42 of the 50 states have declared that they are short-staffed in math and science."[2] Not so coincidentally, in light of the fact that *this* panel was initially concerned with the impact of New Federalism on science and mathematics education, that same *Newsweek* article went on to say:

> Despite President Reagan's State of the Union Message pledge to upgrade science and math instruction, many educators fault the administration for not doing enough. The clamour in Washington for increased productivity and strategic superiority, critics suggest, should lead to considerably more federal support. "Even if the Soviet Union didn't exist, our science education is still badly out of whack," charges James Rutherford of the American Association for the Advancement of Science. "What kind of country puts computers in arcades but not in a physics classroom?"'[3]

In addition to the well-publicized crisis evidenced by the two examples just noted, the situation has been further documented in terms of urgency by examining special aspects of the situation. For example, the January 1983 issue of "Capitol: Woman, A newsletter of the [Michigan] House Committee on Constitutional Revision and Women's Rights" stated that a study just released by the Michigan Project on Equal Education Rights (PEER) in conjunction with the American Association of University Women with assistance from Church Women United had collected math data from 113 districts throughout the State of Michigan.[4] The main conclusions are less than comfortable to contemplate:

> *The most disturbing finding in the study is the precipitous drop of over 50% in math enrollment after students have completed Algebra I, usually in the ninth grade.
>
> *By the twelfth grade, only 36% of the girls and 45% of the boys are taking math and not all of these students are in courses considered advanced math.

Furthermore, the Washington "Newsletter" of the American Library Association had noted, in November of 1982, that "the 25th anniversary of Sputnik finds Congress once again concerned, along with educators, scientists, and business and industry leaders, about the state of math and science education. Numerous bills have been introduced to improve the teaching of math, science, engineering, computer science, and foreign languages,"[5] and, as has already been noted, the National Science Board had set up, in the spring of 1982, a "commission to study problems in precollege math and science education. . . . Teachers fear that unless precollege math and science education is improved, more high school graduates will be leaving school without the tools needed to get ahead in an increasingly complex world."[6] By February of this year, the *U.S. News and World Report,* in an editorial on "The Plague of Illiteracy" emphasized that, in 1981, "nationwide, half the teachers newly employed for high-school science and mathematics were not certified to teach those subjects."[7]

With such a general but significantly ominous set of cues, it seemed likely that my title relating to "myth or reality" with respect to Michigan was a rhetorical question. It is here that Twain's supportive words have been helpful for there is not one answer, but actually several to the question of the crisis in Michigan—and time, or procrastination, has made a difference.

If, for example, I had been highly ambitious and used all the predictors which were observable when Dr. Shoffstall first called me, there would be little doubt about the impact of Reagan's New Federalism in Michigan. There were bleak predictions by those who saw federal funding for research heavily impacted and resources for education for science and mathematics at an even more critical level. In preparing this paper, a review was made of the research funding at the major academic institutions in Michigan. Except in those institutions where research funding was firmly tied to long-term commitments which checkmated the Reagan budget cutbacks, a definite patternn developed between 1978 and 1981. That pattern was summarized by Dr. Lewis Pino, then Director of the Research and Instructional Services unit at Oakland University. In each of the annual reports prior to the fiscal year 1981, Lew had continued to predict that external federal funding would double between 1977 and 1982. Then came the New Federalism, the concept that the federal government would return to the states their responsibilities which had, until Reagan's administration, gradually been assumed to a greater and greater degree by the national government. Until the Reagan program was implemented, Oakland's annual funding report, as did those of most other Michigan colleges and universities, had indicated that each year had brought an increase in basic funding for scientific research. Funding for science education programs was not at an all-time high, but it was still substantial. However, in 1981, Pino noted that, under the preliminary guidelines from the New Federalism, "the first and most obvious observation is that the total of grants and contracts received this year is 5.7% below the total attained last year."[8] Although Pino also noted that the reduction was apparently based on the vulnerability of equipment and travel requests, he goes on to state, "We have not yet felt the impact of reductions proposed for various federal agencies."[9] Therefore, with a tip of the hat to Mark Twain's support of procrastination, a paper prepared at that point in time would have concluded that New Federalism in Michigan was indeed a significant and grim factor limiting future development. As President Reagan had stated, "I dream of the day when the federal government can substitute for block grants [a step which he considered to be intermediate] the turning back to local and state governments of the tax sources we ourselves have preempted at the federal level, so that you would have those tax sources."[10] In Michigan, that dream was seen as a nightmare! The state was in the midst of a growing fiscal crisis which would bring about a major change in the Governor's office; the state's economy had been in decline for at least three years; and the budget was not balanced—to put the problem mildly. The premises upon which block grants were proposed were seen as especially devastating in a state which could not handle its own internal needs—much less absorb programs which had been supported by the federal government.

Second, as I further reviewed my procrastinating, if the question of the impact of those same block grants had been reviewed in this paper a few months ago, the reality of the math and science crisis would still have seemed all too obvious. Although I was unable to locate a review of the effect to date of block grants in Michigan, the Spring, 1983, issue of the *Journal of the Society of Research Administrators* contains an article on the impact of the 1982 block grants in California. The author, Williams, concludes:

> If the Reagan Administration is successful in achieving a major shift to the New Federalism, the effects on research in America—particularly in the social sciences and human services—could be substantial.[11]

Williams' comment about California was echoed in Michigan by Superintendent of Public Instruction, Phillip E. Runkel. Writing in September of 1982, Dr. Runkel stated,

> Historically, the federal government's role has been to initiate, to support, and to encourage new and needed programs and innovation—programs and innovations mandated either by the times and circumstances or by the courts. . . . The 1980 presidential and congressional election brought about a

> dramatic change in the course to which the federal government was committed. . . . This is a reality. It seems to me that now we must proceed to adapt, to modify, and to make what changes might be necessary to sustain and strengthen the educational enterprise.[12]

So much for procrastination and so much for the fact that none of this is, unfortunately, new to any one of us in this room. The roots of the dilemma are so well-documented that the New Federalism serves mainly to focus our attention on a problem which has been identified by many key authors and researchers. Let me share with you, however, a series of harsh questions which are currently being addressed by one organization, The Central States Universities, Inc. CSUI is a consortium of twelve midwestern universities which was established in 1965 "at a time when the fervor for improving the climate for science and mathematics education and research was at a peak."[13] It has followed, with growing dismay, the decline of the late 1960s and 1970s to a point at which, in October, 1981, at the annual meeting, a list of concerns was specified:

> The scientific knowledge, training and motivation of entering college students has declined in recent years.
>
> Some believe the decline is the result of the new mathematics, physics, chemistry and other programs, presumably those funded by the NSF.
>
> The teachers of science and mathematics in the elementary and secondary schools are poorly prepared in their fields and do not motivate their students.
>
> The standards to maintain quality in public schools, such as courses and graduation requirements in the public schools, teacher certification requirements and college entrance requirements, should be examined and possibly changed.
>
> What has happened to ACT scores in the sciences in the last 20 years?
>
> What has happened to the number of college majors in sciences, mathematics and engineering in the last 20 years?
>
> Public schools have systems that identify and provide special instruction to students who are poor readers. There is no such alert system for students who are poor in mathematics or science.
>
> Universities have special remedial courses in mathematics for high potential or opportunity students who do not meet normal admission requirements. Have these programs been successful? Can they be used at the secondary level?
>
> Is the course content in public school science and mathematics courses adequate?
>
> Is there an anti-science mood among the general population? If so, is this posture because of misunderstanding?
>
> Scientists have been ineffective in selling the importance of science to the general public and school boards.[14]

At Western Michigan University, one of the noted authorities in the area of science education, Dr. George Mallinson, was asked, as the Institutional Representative to the Consortium, to prepare a research proposal for consideration by the Council. That proposal would address the concerns as outlined above. Mallinson later summarized the Council's reaction: "There seems to be a consensus, correct or not, that science educataion is 'taking a back seat' at nearly all levels. . . . The situation is viewed as potentially disastrous for the wellbeing of the United States."[15] [For those of you who are readers of *The Chronicle of Higher Education,* this statement quite neatly forefells the April 13, 1983 "Point of View" prepared by fellow panelist James Rutherford, which highlights "The Dangerous Decline in U.S. Science Education." His commentary began,

> Science education is in rapid decline in the United States, and the price to the country is nothing less than a dangerous undermining of our economic health, productivity, and national security. . . At the same time, our own science-education system is deteriorating, especially at the precollege level.][16]

The Council of the Central States Universities, Inc. then authorized Mallinson to undertake a study of the factors related to the science and mathematics crisis. A preliminary report of March 31, 1983, indicates that Mallinson's research has first focused on four areas:

1. A survey of the number of graduates with majors in the various fields of science and mathematics who also had teaching certificates;
2. Collection of data concerning state regulations for subject-matter content for teaching in the various fields of science and mathematics;
3. Subject-matter requirements for graduates in the various fields of science and mathematics who intend to teach; and
4. Collection of data concerning state-mandated requirements in science and mathematics for graduates from high school.[17]

The data are not yet ready for public dissemination, but the Consortium will be meeting on June 8 and 9, at W.M.U., to consider some of the preliminary conclusions. For those of you who wish to know more about these matters, please contact Dr. George G. Mallinson, at Western Michigan University. The data were gathered only from the twelve member institutions of CSUI, but, when analyzed, will undoubtedly have considerable value, not only with respect to midwestern institutions, but to the entire nation. With respect to myth or reality, it is unhappily safe to say that Michigan has not only experienced a decline in graduates, but its internal economical situation has sent mobile science and mathematics teachers to other, better financed educational systems.

Now we are at the point to which the original question was addressed. Does Mark Twain, in suggesting that one should put off tomorrow's activities until the day after tomorrow, have something to say about the crisis in Michigan. Of course, as you all must suspect, he does. It was Twain who said, "There was things which he stretched, but mainly he told the truth," but it was also Twain who cabled from Europe to the Associated Press, "The report of my death was an exaggeration."

Therefore, let me remind you that this commentary began with the premise that "time, or procrastination, has made a difference." Although the academic institutions which were reviewed with respect to external funding did show a decrease in funding in 1981—in selected fields—1982 was a different game indeed. A year later, in July of 1982, Lew Pino wrote a different report from that quoted earlier. It was not altogether positive, but it did hit at the essential problem:

> As anticipated, our total grant and contract income is down due to the continuing cutback in Federal support for higher education. Interestingly enough, the reduction is limited to training grants and contracts. Our level of external support for research is holding up quite nicely, as is support for developmental efforts.[18]

Even then, Pino suggested that the next several years might bring a continued decrease in training grants, but he also saw that "there are substantial increases in research support planned for the defense-related agencies and for the National Science Foundation."[19] By January of 1983, the presidents of Michigan institutions of higher education had asked for and received a public opinion polling of state citizens which could be matched to the national opinion survey on higher education. Those results include the following significant responses.

> 1) Michigan residents especially favor continued government support of academic research in medicine and the physical sciences.
>
> Eighty-seven percent of Michigan residents think the federal government should continue to underwrite medical research at Michigan universities, and 71.2 percent think government should continue to fund research in the physical sciences; this figure compares to 64 percent of the national sample. Fewer favor federal support of research in the humanities (18.4 percent), the social sciences (56.7 percent), and the programs in the arts (13.4 percent).
>
> 2) Michigan respondents view science-related and professional programs as the most important aspects of college curricula. Less importance is given to programs in the arts, humanities, and remedial learning.
>
> If declining enrollments should lead colleges to cut back on certain curricula, a majority of Michigan respondents think programs in engineering and the applied sciences (92.8 percent), professional fields (95.2 percent), the hard sciences (94.6 percent), and the social sciences (70.8 percent) should be cut back only slightly, if at all.[20]

Although these two quotations from the report sent to Members of the Presidents' Council do not deal with many other concerns relating to higher education, they do reflect that a basic understanding of the crisis in science education, or the need for the government to re-address the question of our technological shortfall was widespread even in a state that was facing financial bankruptcy. If the populace could have written a community report, it might well have used the phrasing found in the Nielsen and Polishook occasional paper on "Science Education in the Schools and the Academy," which was published in *The Chronicle,* March, 1983.

> Our first priority must center on the elementary and secondary schools—particularly the public institutions which educate most children—where requirements for advancement and graduation should include a greater emphasis on math and science. We must upgrade conditions in the teaching profession so that schools and colleges can attract and keep quality faculty. Colleges and universities are themselves endangered by the inadequate preparation of undergraduates and curriculum standards for college-bound students, whether admitted to two-year or four-year institutions. . . .
>
> We can make no long-term compromises in resolving the grave problem of science education in this nation [or in Michigan]. If we do not move forward with success, the United States will retrogress in a failure that encumbers the productivity of our economy and undermines the stability of our democracy.[21]

In conclusion, it would be delightful to say, along with Mark Twain, "Hain't we got all the fools in town on our side? and ain't that a big enough majority in any town?"

However, there are still the quiet but distinctive voices who are explicit as well as implicit in identifying the elements of the "Science Crisis in Michigan" as reality. The situation is clear at this particular day in time—regardless of the fact that some suggest we should wait until tomorrow. As the National Commission on Excellence in Education recently headlined in *The Chronicle of Higher Education:* "OUR NATION IS AT RISK. Our once unchallenged preeminence in commerce, industry, science, and technological innovation is being overtaken by competitors throughout the world."[22] On May 11, 1983, that same *Chronicle,* in summarizing the report of a panel established by the Twentieth Century Fund, an independent foundation which studies public policy issues, noted that there must be an "emphasis on programs to develop scientific literacy. . . [and] to insure the availability of advanced training in science and mathematics."[23]

The myth *has* become reality despite the promising reports regarding legislation currently before the U.S. Congress. Yes, there will be millions of dollars voted to ease the science-teacher shortage. Yes, there will be a recognition, as a colleague research cohort says, that "science education is everyone's safe, 'apple-pie and motherhood' cause right now." He also suggests that both the Department of Education and the NSF advocates will "get a piece of the action."[24] A bill has passed the House, the Senate Committee has acted, and only the negotiating of "how much" is to be concluded. That point is moot; there will be monies to support science and math education projects to a greater degree than when the New Federalism was proposed. In Michigan this will undoubtedly mean that the most research support will continue for the hard sciences, but the doors are once more ajar with respect to education projects, notably research and demonstrations. If I could procrastinate for another few months, there might be an even more optimistic tone to this presentation. However, the implicit implications are there in the studies of the Central States Universities, Inc., in the funding emphases indicated in Governor Blanchard's budget addresses, in the external awards already reported in my institution as well as others throughout the state, and in the citizen-wide recognition that this is not an imaginary or political federal ploy. Recently, a memorandum from AAAS was sent regarding the CBS broadcast of the "I, Leonardo" television special. As many of you are aware, AAAS has published a pamphlet on science and mathematics education which suggests the means by which citizens can become involved in this issue. Although the message has been explicit throughout this brief paper, the statements in the pamphlet reflect the reality—and not the myth—of the science crisis in Michigan.

> America [and Michigan] has a great deal at stake in the worldwide, high-technology revolution. There is no question that people in the America [and Michigan] of tomorrow must be prepared for jobs and responsibilities in an advanced technological age. Clearly, more than just a handful of experts will have to know and use science and mathematics—and understanding starts with education.
>
> There are calls for action at every level—federal, state, and local. But a *sustained* effort to reverse the decline in science and mathematics education must come from concerned people like you. Only if enough of us work actively for change in our own communities can we strengthen and enlarge the science and technology potential of our entire nation.[25]

Or, as Twain might summarize it all: "Man is the only animal that blushes. Or needs to."

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IMPACT OF THE NEW FEDERALISM AT THE STATE LEVEL

JOHN J. McDERMOTT

Senior Adviser, Science
Pennsylvania Department of Education
Harrisburg, Pennsylvania 17120

ABSTRACT

A discussion of the new federal policies toward science and mathematics education and their effects at the state and local levels. Plans for the improvement of these areas utilizing private and public resources at the state level are described.

I. IMPACT OF THE NEW FEDERALISM

The so-called "New Federalism" with its accompanying cuts in education in general and science education in particular has had a significant and at times disastrous impact at the state and local levels. I shall limit my descriptions of this impact to Pennsylvania, where I have first-hand knowledge of its effects. Any attempt to address the impact of Federal budget cuts elsewhere would be strictly hearsay, and therefore unacceptable.

Pennsylvania, like many other states, has long depended upon Federal funds to help pay the salaries of Department of Education personnel. Many of these federally funded positions were in the Currriculum Bureau. The cessation of these funds, coupled with a commitment not to increase state taxes, either for economic or political reasons, resulted in extensive furloughs and reassignments via the "bumping" process in the Department of Education. In the area of Science Education the number of curriculum specialists was reduced from three to one by the furloughing of one science adviser and the reassignment of another. The remaining science adviser was also given the added statewide responsibility for Environmental Education, since the Environmental Education Adviser position was abolished. Similar furloughs and doubling of assignments took place in other curricular areas as well.

These severe reductions in personnel resulted in changes in the quality and quantity of services which the Department was able to give to the schools. The Bureau was no longer able to provide services to individual school districts as it once did, but was forced to work through the 29 Intermediate Units. Unfortunately, most Intermediate Units did not have science or mathematics specialists on their staffs, and in any case they, too, were in the throes of furloughing personnel due to budget decreases. Most curriculum development projects had to be abandoned for obvious reasons. Increased use of telephone and correspondence tended to replace on-site visits to schools in order to increase what could be done in any single day. In short, the quality and effectiveness of services in science education diminished.

Pennsylvania has had a long history of aid provided to the Department from the scientific and science education community. Many individuals have, over the years, donated their time without any thought of recompense in order to aid science education. These generous individuals from every section of the Commonwealth have continued to give their time and efforts to help schools. So, as a direct result of the New Federalism our Department is now adapting to an entirely new method of operation. We are relying on these persons more and more. These changes have been painful both to us and the schools, but we are doing our best.

In addition to the loss of direct Federal funding to the State, there has also been a statewide impact caused by the seemingly untimely demise of the National Science Foundations' Directorate for Science Education. This valuable source of financial aid in developing programs to meet specific needs in science curriculm and in teacher training programs lost its funding, due to Federal budget cuts. However, with the current concern with science and mathematics education it seems fairly certain that part or all of this funding will be restored, and that the NSF Directorate for Science Education will continue to exist.

Federally supported teacher training institutes such as those which flourished in the post-Sputnik era have all but disappeared at a time when we desperately need to upgrade teacher skills, as evidenced by student scores on various nation-wide testing programs. This loss of teacher training institutes is most unfortunate at a time when we are not producing sufficient teachers to replace those lost by retirement or other causes. For example, Pennsylvania certified only two teachers holding a physics/math combination in 1982. North Carolina reports that 27% of its science classes on a statewide basis are not being taught by appropriately certified science teachers.

Available data shows that science and mathematics teachers are leaving teaching at about a rate of 4% per year, usually for higher paying positions in industry. In the need to fill positions, it is reported that 50% of all science teachers on a nationwide basis are not legally qualified to teach science. Pennsylvania issued 106 emergency science teaching certificates in 1982. This use of unqualified teachers can only have a deleterious effect upon the production of future scientists and engineers. The situation will worsen as those teachers trained in the early post-Sputnik era begin to reach retirement age or leave for industry. The real tragedy is that insufficient numbers of replacements are being trained. In effect we have a situation where industry is hiring science and mathematics teachers away from the classrooms because of the present shortage of technically trained persons available for employment. This practice results in even fewer technically-trained persons in future years. It is an analogous situation to the one in which hungry people are forced to eat their seed corn, thus ensuring famine during the future year.

Any piece of scientific equipment has a certain usable life span, and much of the equipment purchased under the National Defense Education Act Title III program is wearing out. Due to budgetary limitations schools are failing to purchase new equipment for replacement purposes.

The NDEA Title III program helped to equip the public schools as they never were equipped previously. Schools purchased such major items as microscopes, analytical balances, scalers, and microprojectors for long-term use. This was not a giveaway program. The schools paid 50% of the cost.

However, this program ceased to function several years ago. School Boards, faced with the double-edged sword of increasing costs coupled with decreasing revenues, are opting for cutting equipment purchases rather than furloughing teachers. As a result, new equipment is not being purchased as older equipment wears out. Student laboratory experiences are decreasing in quality.

All of these factors have converged to produce the current crisis in science education in Pennsylvania. The New Federalism was the final straw which broke the proverbial camel's back.

I would now like to make a direct quotation:

"The problems today in elementary and secondary school science and mathematics education are serious—serious enough to compromise America's future ability to develop and advance our traditional industrial base to compete in international marketplaces. Failure to remain at the industrial forefront results in direct harm to the American Economy and to our standard of living."

These words were spoken by Ronald Reagan at the National Academy of Science/National Academy of Engineering Convocation on Precollege Education in Mathematics and Science in the United States in May, 1982. So the author of the New Federalism, which produced the current crisis, knew its effects quite well. He also promised to veto any spending bill designed to relieve this situation, labeling it a "budget buster."

At the same conference Paul DeHart Hurd said:

"We are raising a new generation of Americans that is scientifically and technologically illiterate."

John Slaughter, Director of the National Science Foundation, added:

". . . the indicators of deterioration of the quality and quantity of education in mathematics, science and technology . . . are the unmistakable harbingers of a growing chasm between a small, scientific and technological elite, and a citizenry uninformed, indeed ill-informed, on issues with a science component."

These descriptions of the current status of science education as well as several possible action appear in publications Science and Mathematics in the Schools: Report of A Convocation, available from the National Academy of Science.

II. REACTIONS TO THE NEW FEDERALISM IN PENNSYLVANIA

The once mighty industrial giant called Pennsylvania is in the painful throes of economic change. Our iron and steel industries are in serious jeopardy due to foreign competition and our failure to modernize our production facilities; our coal, unfortunately, has an extremely high sulfur content; our oil wells, although producing the world's finest paraffin-based lubrication oil, are low in production. Extensive economic studies have indicated that Pennsylvania's economic future no longer lies in these old standbys, but will most likely depend upon small, privately-owned, high-technology corporations. We must take steps to retain our citizens, especially those possessing scientific and technical skills, rather than losing them to other states. Our planners realize that we must be able to guarantee a supply of technically-trained persons in order to attract and retain high-technology industries. We also realize that the only way in which we can even begin to guarantee this pre-requisite supply of technical personnel is to significantly upgrade our efforts in science and mathematics education, to make huge efforts to attract our best students into scientific and technical fields, and to give them the guarantee of future employment in the Commonwealth.

The tremendous growth potential of high-technology industries depends for its realization upon three types of skilled workers: (1) entrepreneurs—the conceptual leaders who judge innovative ideas and manage businesses more complex and diversified than ever before in the history of man; (2) engineers—the originators and developers of new technology and new technological applications, using state- of-the-art knowledge; (3)technicians—those who make up the bulk of the work force in companies which will require them to possess a high degree of technological sophistication. The vital roles played by these three types of workers are central to advanced technology industries.

Pennsylvania has already begun initiatives specifically aimed at developing persons possessing the skills needed for each of these three roles. A computerized inventory of expertise in international relations has already begun to increase international exports form Pennsylvania.

The Ben Franklin Partnership has been formed to award challenge grants on a competitive basis to establish advanced technology centers composed of consortia of businesses, colleges and universities.

State-operated job training programs will offer instruction in areas of expertise needed by advanced technology industries. This effort will extend to colleges and universities.

Economic incentives including low cost loans and tax breaks are being consisered to aid high-technology industries in locating in Pennsylvania.

The high-technology industries which Pennsylvania wishes especially to attract include robotics, biotechnology, specialized materials such as specialty steels and crystalline laser lenses, advanced medical devices, computer applications, computer-assisted design, computer assisted manufacturing, agricultural technology and telecommunications products.

The Pennsylvania School for the Sciences has been founded to reach scientifically talented students, many of whom we fully expect to be the creative scientists and engineers who will make Pennsylvania corporations leaders in technological innovation in the years ahead.

Computer literacy will be required of all students graduating from our schools in future years.

Increased graduation requirements in mathematics, science, and technology will be aimed at insuring that every Pennsylvania student graduates from high school prepared for entry-level employment in a technologically sophisticated job market.

Special state resources are being directed toward upgrading science teachers and increasing the supply of highly qualified science and mathematics teachers for our classrooms. This would include an undergraduate loan forgiveness program to attract bright young persons to enter science and mathematics teaching; a program of graduate study fellowships for outstanding in-service teachers of science and mathematics, and an extensive in-service program for practicing teachers. We are also arranging for the part-time use of corporate mathematicians and scientists in the schools and the arrangements for mathematics and science teachers to work in industry during summer vacations.

Within the curriculm we are conducting a series of programs designed to increase student interest in the sciences such as the Women in Science Program, the Pennsylvania Junior Academy of Science, the Junior Science and Humanities Symposium, and a Computer Technology Initiative.

As I previously indicated, increased graduation requirements are being considered which will significantly increase the science and mathematics education requirements of all our young people. If all proceeds as is presently projected, Pennsylvania will require more science and mathematics courses for graduation than any other state in the nation.

Student progress will be carefully monitored in grades 5, 8 and 11 by means of the statewide Educational Quality Assessment Program operated by the Department of Education.

We are presently completing an intensive statewide needs assessment to determine the projected needs for science and mathematics teachers through 1988. This needs assessment will also provide data to determine the in-service needs of practicing science and mathematics teachers

From the data gleaned via this needs assessment we will formulate a comprehensive state plan to systematically upgrade precollege science and mathematics education with the Commmonwealth. This plan will detail the specific actions to be undertaken and will make provisions for the inclusion of complete formative and summative evaluation components.

At the time of this writing, there seems to be assurance that the Congress will once again provide funds in an attempt to improve science and mathematics education, and that these funds will pass into local hands through the state education agency. If and when these funds become available we will use them in a way supportive of the previously mentioned state plan which is based upon actual, documented needs.

These, then, are Pennsylvania's major responses to the New Federalism, to a rapidly changing job market, and to an urgent need to upgrade science and mathematics education. We plan to rely increasingly upon our own resources, to resolve documented needs, and to resolve these problems at the local level.

Pennsylvania celebrates its 301st birthday this year. Her sons and daughters are determined that she will be stronger and even more vigorous on her 401st birthday and beyond.

The NAAS/AAAS Symposium: The Crises in Science and Mathematics Education, 1983.

THE CRISES IN SCIENCE AND MATHEMATICS EDUCATION: HOW INDIANA IS COPING

WALTER CORY

Coordinator for School Science
Wright Education Building #253
Indiana University - Bloomington, IN 47405

ABSTRACT

Many Indiana citizens are questioning our current educational system. They want the very best education for their children and for all citizens. More vigorous requirements for high school graduation have been proposed by our Department of Public Instruction in the areas of science, mathematics, English, etc. Legislation has been proposed to provide forgivable loans for those who will teach in fields of critical shortage such as mathematics and physics within the public schools of Indiana. The Indiana Academy of Science, the Hoosier Association of Science Teachers, and other scientific/technical societies have proposed a variety of options to assist schools and students in the improvement of science and mathematics instruction. Other organizations without this technical orientation are likewise moving to improve our educational climate in Indiana. Many colleges and universities are considering methods by which they may assist teachers and school corporations as they seek to deal with the current crisis in science and mathematics education.

I will describe how one state is coping with the crises in science and mathematics education. There are many indicators of this coping process, and I guess I should tell you what "to cope" means. *Webster's New World Dictionary (of the American Language)* suggests, "it is to fight or contend (with) successfully, or on equal terms; to be a match for".

We are not a match for the problems of science and mathematics education, even within the State of Indiana. But we are trying. I hope that we may cope better within the next few years with these crises within the State of Indiana. And I would hope that other states might also cope well, so that, together, whether we have leadership or funding from the federal level, we may still solve some of our local and regional problems.

I don't think the sum of money which Laurel Grotzinger suggests may be forthcoming from the federal government will be adequate for our purposes. And I worry whether we will successfully use what funds become available. But assuming that we will get some extra money and we will know how to use it properly, maybe all of us can cope better with these problems that you heard addressed earlier. I think in the State of Indiana, as I am sure you would find in your state if you look carefully, we have many very dedicated classroom teachers in the science, mathematics and English and social studies classrooms. And thank God we do! But we don't have enough of them. And too many of those that I can identify over the last ten to 15 years as having been very dedicated and very successful teachers are asking themselves more and more frequently, "What is the use?" "Why continue to bang my head against a wall, when I can make at least as much money, even in teaching, with much less effort? I can become an administrator and make more money." Some have tried that. Some gave up the secondary or elementary classroom and moved on to greener pastures. In 1974, when I left a nine month position in the public schools for a twelve month appointment at Indiana University, I accepted a cut in pay because I felt I was not effective enough as a classroom teacher. I was not dealing too well with the pressures of trying to teach children who were not interested in learning about science.

I know in Indiana that we're going to have to do a better job of training new teachers and retraining those teachers who are still in the classroom so that we can continue to get good education for our young people. I think the dedication of our students is another factor that some of you are acquainted with in your particular situation. Today, in many high school and college classes we find more and more dedication to learning on the part of students. If we didn't have that, I think we'd all be under greater strain.

I hope that all of us will take advantage of this current emphasis upon quality education whether it's a fad or a long-term committment to analyzing the problems of education and improving the situation. We must offer guidance to federal agencies, our congresspersons, the industry and business representatives who are saying, "We'd like to see a better educational system in our state, or our community". "What can we do to make it better?"

There could be lots of money poured into this, and a lot of wheel spinning. But hopefully, those of you who teach, those who prepare teachers, and those who are scientists will provide leadership which, as Dr. Rutherford said, is not coming from Pennsylvania Avenue.

I would like to describe some of the programs which are in place and some of which have been in place for a number of years in Indiana. I should point out as you have probably seen elsewhere, that

> 'If an unfriendly foreign power had attempted to impose on America the mediocre educational performance that exists today, we might well have viewed it as an act of war. As it stands, we have allowed this to happen to ourselves. We have even squandered the gains in student achievement made in the wake of the Sputnik challenge. Moreover, we have dismantled essential support systems which helped to make those gains possible. We have, in effect, been committing an act of unthinking, unilateral educational disarmament"'.

We have the Indiana Academy of Science for which I am Director of Public Relations as I have been since 1975. I have gotten to know many of the people and many of the programs which are supported by the Academy. I also direct the state Science Talent Search, and I am one regional science fair director. So I am involved in a number of activities of the Indiana Academy of Science. Our state academy is one that is quite active and fairly large with about 1150 members. About 150 of those live outside the State of Indiana. In 1984, we will celebrate the 100th meeting of the IAS. The major goal of the academy is to promote scientific research and to provide information to the public on the basis of that research. We try to involve scientists in meetings with the public; sometimes it is more successful than at other times. We don't have the large turnout we would like at some of our state meetings, but in the fall, when we have the paper sessions, there are usually 500 to 550 people in attendance. This includes about 100-150 high school and junior high school students who participate in the Junior Academy of Science.

The Academy provides research grants to students, usually between $500 to $700 per year total, for between six and ten students. We have a research grants for adults program which involves more and more money each year. We are now spending about $18,000 each year on this program. For some graduate students who need $200 to complete their dissertation or $500 to get started, it's a Godsend. So we, in a very conservative state, without a geat deal of financial resources, are doing a great deal which is positive. We have been doing this for many years, but it hasn't always been recognized.

We're starting a new program this year which provides research funds for secondary school teachers who would like to learn more about science and the methodology of science. One of our concerns has been, as we work with these outstanding students from about 20 or 25 high schools, we see many of the same teachers, year after year, until they get burned out or retire. There are many other schools with good students who are not taking advantage of these opportunities for scholarships to college, for travel, opportunities to make their school a litte better understood, to give their teachers a pat on the back, to meet with students from around the country and around the world in some of these science fairs and talent search competitions.

I don't know yet how our new program on teacher research grants will work out, but we have at least five teachers who hope to apply for funding this year. We have $3,000 to be awarded to two people. If the program is successful this year, we hope to expand the program in 1984 to include more teachers. If any of you have an idea that this might be worth doing in your academy, I would be happy to speak with you later.

There is the Hoosier Association of Science Teachers which is a state affiliate of the National Science Teachers Association in Indiana. We have approximately 550 members, probably 50 or more of those are also members of the Indiana Academy of Science but this organization involves teachers at the elementary, secondary and college levels. The secondary teachers constitute the largest group. We have a quarterly journal, *The Hoosier Science Teacher,* and an annual meeting held in February. This year, 596 persons registered, which was our largest turnout, partly because we had some outstanding speakers, but also because there was more public awareness of the problems in science education. The administrators in the various schools seemed more interested in having their teachers attend the meeting to see what they might do to improve the situation in their schools. We hope that this trend will continue in 1984. If some of you wish to attend, it will be held in Indianapolis on February 10 and 11.

There is an Indiana Science Education Fund which involves some of the same individuals as in the IAS and the HASTI. The Indiana Science Education Fund began in 1965 as an effort of Dr. Karl Kaufman who was then Dean of Pharmacy at Butler University. He had been the program chairman for one of the International Science and Engineering Fairs held in about 1960 in Indianapolis. Money in the fund is used to finance a part of the transportation costs and other costs associated with sending 24 regional science fair winners to the International Science and Engineering Fair each year. When I took two students and their sponsoring teachers to Albuquerque earlier this month, it cost us only about $225 each for round trip airfare, lodging for four nights, some meals and the registration fee. We find others are envious of us because of this low cost. They also envy us because our students usually do very well in collecting awards. We are very proud when we see the students from Indiana step to the stage to receive their awards and be recognized for their efforts in research. The teachers share this pride, and such recognition seems to help them in their communities.

In Indiana, there are about 30,000 students who compete in school and local fairs. From these, 24 students are selected each year to compete in the International Science and Engineering Fair.

Now, I want to turn to the Conference on the Crisis of Mathematics and Science Education in Indiana Elementary and Secondary Schools held at Indiana University last October. We will examine some of the recommendations found near the end of the report I distributed to you[2]. I selected those recommendations from our report which I consider most significant for discussion here today (See Addendum 1). Some of these recommendations are now being implemented; others are still being discussed. I think ours was a good conference. We had over 300 people in attendance. Those present represented state government, more than 23 universities and colleges, the public and private schools and the business community.

Our governor now is talking about extending the school year by 25 to 30 days, but in the last session of the legislature it was not possible to allocate the funds required to extend the school year by even five days. It would be very costly. Therefore, I don't think we are likely to see the school year in Indiana extended by 25 to 30 days.

In one recommendation, we ask for three years of science and three years of mathematics for all students in grades 9-12 as a requirement for high school graduation. This was not achieved, but the general Commission of Education did require two years of science and two years of mathematics effective with the graduation class of 1989. We urge students who plan to major in science to study four years of science and four years of mathematics in high school. I would say that if students can schedule only two years of science, it should be one year of biology and one year of physical science.

Forgivable loans have been discussed at the state and federal levels. We encourage college students to teach math or science and have the loans forgiven for up to 50% of the balance due for three to five years of service in the public schools.

We would also like to insure that middle school and elementary teachers are adequately prepared to teach science and math. If we succeed in getting legislation on this, we must develop some decent programs so that if teachers flock back to the college classroom in summer institutes and so forth, we will do a good job with them.

In regard to our suggestion that colleges and universities raise admission standards, we recognize that this would be difficult because the population of 17 and 18 year olds is declining.

On our recommendation that math and science students at the college level should volunteer as part-time teachers in the schools, we have some doubts as to how effective this might be. With the proper guidance, perhaps this group could be very helpful. It could be better than to retrain teachers with majors in other subjects who cannot locate a job teaching in those areas. Some of those surplus teachers worked hard to avoid science and math courses. They might have poor aptitude in science and mathematics.

Recommendation for the private sector include part-time employment of math and science teachers during the summer. Some of us are concerned that this might result in a drain of the better classroom teachers out of education. Perhaps retired scientists and engineers would be a good source of part-time or full-time teachers if they are given some training on the special needs of young people and a refresher course in the sciences or mathematics.

In conclusion, I believe that Indiana can offer many examples of proven programs to others who wish to improve oportunities in science and math education. We have much room for improvement in the state, but I am proud to describe those things which I think we are doing well. Because Indiana ranks about 34th in terms of per pupil expenditure, we are not doing well in that area. I think we could improve that standing, if we were to receive extra money for education. I am pretty optomistic that the public and private sectors will do a better job in Indiana. We must have a concerted effort in education at all levels for a long and difficult struggle. I hope that you in your state will do what you can to improve education because our nation cannot afford to delay such efforts much longer.

LITERATURE CITED

1. *An Open Letter to the American People, A Nation at Risk: The Imperative for Educational Reform,* The National Commission on Excellence in Education, U.S. Department of Education, Washington, D.C., April, 1983.
2. *Facing the Crisis of Mathematics and Science Education in Indiana Elementary and Secondary Schools,* School of Education, Indiana University, Bloomington, Indiana, 1983.

ADDENDUM 1

SOME RECOMMENDATIONS OF THE CONFERENCE ON THE CRISIS IN MATHEMATICS AND SCIENCE EDUCATION IN INDIANA ELEMENTARY AND SECONDARY SCHOOLS:

BLOOMINGTON, INDIANA
OCTOBER 19, 1982

A. Recommendations for State Government
   1. The State Department of Public Instruction should establish a policy that all high school graduates will have studied mathematics and science for at least three years in grades 9-12. Students preparing to attend college should be urged to study for four years of mathematics and science.
   2. A program of "forgivable" loans to college students preparing to teach mathematics or science should be established.
   4. A policy should be implemented that will ensure that elementary and middle/-junior high school teachers are adequately prepared to teach mathematics and science.
   5. State agencies should work with colleges and universities to identify ways to attract women and minorities into mathematics and science careers.

B. Recommendations for School Systems
   1. Both mathematics and science should be taught to all students during every year in grades K-8. School systems could hire mathematics and science consultants and resource teachers for the elementary grades to facilitate this.
   2. School systems should hire only qualified teachers to teach mathematics and science in grades 6-12.
   4. School systems should establish a policy of professional development incentives for teachers in critical shortage areas.
   5. School systems should require all students to study about computers to the extent necessary to ensure computer literacy.

C. Recommendations for Colleges/Universities
   4. College/university mathematics and science educators should find more ways to utilize computers as instructional devices in mathematics and science classrooms at all levels. They should also establish workshops for developing computer literacy.
   5. Colleges/universities should raise their entrance requirements in mathematics and science.
   6. Colleges/universities should actively recruit women and minorities into mathematics and science careers.
   8. College/university mathematics and science students should be encouraged to volunteer as part-time teachers in schools where mathematics and science teachers are needed. They should also serve as resource persons in elementary schools.

D. Recommendations for the Private Sector
   1. Businesses/industries should provide part-time and summer employment for mathematics and science teachers.
   2. Businesses/industries should assist state and local governments in providing low interest loans to students who are preparing for teaching careers in mathematics and science.
   4. Businesses/industries should devise means to allow employees with strong mathematics and science backgrounds to teach mathematics or science part time in schools.
   6. Business/industries should help support the training of retired persons with strong mathematics and science backgrounds who might be interested in part-time mathematics or science teaching in the schools.

E. General Recommendations
   2. There should be a cooperative effort among the four sectors to determine attractive opportunities for continuing in-service education for mathematics and science teachers.
   3. The four sectors should establish more mathematics and science teacher resource centers around the state.
   4. The four sectors should work together to identify means for recognizing and rewarding outstanding performance by both teachers and students at every level.
   5. All sectors should provide incentives to raise the prestige of mathematics and science teaching as a profession.

It is hoped that action will soon be taken on these recommendations and that the current crisis in mathematics and science education in Indiana's elementary and secondary schools will be solved. The most important resource our nation has is its youth, and we are jeopardizing our future by neglecting our next generation.

The NAAS/AAAS Symposium: The Crises in Science and Mathematics Education, 1983.

THE CRISIS IN SCIENCE EDUCATION: A MISSISSIPPI PERSPECTIVE

DUDLEY F. PEELER, JR., Ph.D.

Executive Officer
Mississippi Academy of Sciences
Associate Professor of Neurosurgery (Research)
University of Mississippi Medical Center
Jackson, Mississippi 39216

ABSTRACT

In Mississippi there has developed, concomitantly with similar events nationally, an awareness of serious deficiencies in science and mathematics education in public schools throughout the state. This is seen by most observers in the context of deficiencies of crisis proportions within the state public education establishment, particularly at the primary and secondary levels. This occurs within the historical milieu of persistent inadequacies of state resources, political obscurantism, and dramatic social changes which have lent to the problem a continuing aura of crisis, for which the true crisis—the point of decision—has now arrived. Recent noteworthy achievements giving elevated priority to reorganization and enhanced state governmental support of primary and secondary public education offer great promise for improvement, but do not negate the potential effect of loss of federal funds and realignment of funding procedures. Other social forces within the state reflecting extremes of political, social, and fiscal conservatism remain potent obstructions to developing and maintaining necessary governmental and public support for science education, and for public education in general. The interaction of these factors from an historical perspective and in the present context are reviewed. Remedial actions proposed or undertaken by various social and institutional sectors, including current and potential activities of the Mississippi Academy of Sciences are discussed.

In Mississippi, the problems currently facing science and math education are generally of the same nature as for the rest of the country, although of greater severity. But historically there have been experiences which were peculiar to the South and which were of great, sometimes overwhelming, significance. Throughout the century, a persisting legacy of depressed economic conditions and an agrarian culture tended to stifle development of public education. A primary influence in this direction, of course, was the period of post-war reconstruction which ironically resulted it the return to power of those same political and social forces which were destructive of the old South and became severely detrimental to the new. After 1875, public education in Mississippi became a low priority item. For decades there presisted the attitude that, "literacy is not an assest in the plantation economy." This was applied particularly to the black population, but generalized readily to most rural whites. A subsequent overriding burden for an educational system which persistently lagged in its development behind other geographic regions (and often behind other southern states) was the existence of a dual system. Politically imposed, legally mandated "separate but equal" programs were in actuality the intellectual and educational repression of essentially one half of the state's population. Major influences, also, were such economically devastating events as severely depressed prices for cotton, the single major crop in Mississippi, at the end of World War I, and the Mississippi flood of 1927.

But in spite of economic disadvantage and contrary political and social forces, there have been throughout strong pressures for development of quality public education. In almost every decade, including the 1930's when the depression initiated a famine for public education, there have been significant improvements made in Mississippi and throughout the South. Nevertheless, the legacy of long years of inadequacy and neglect remained, and southern public educational efforts and accomplishments continued to remain significantly behind most of the rest of the nation. (It is noteworthy that an influx of outside funds, and sometimes initiative, was an integral part of each phase of educational improvements. In more recent decades, this funding most often has come from federal sources.)

In the present decade, Mississippi's status with respect to science and math education reflects national trends, if not magnifying them. The elementary and secondary schools, with some outstanding exceptions, are preparing their students poorly for this era of technological change, whether in terms of occupational skills upon leaving high school, preparation for continued education at higher levels, or merely having a basis for coping. Poor attendance and high drop-out rates have plagued Mississippi schools throughout the century. Mississippi in 1981, as in preceding decades, had the highest drop-out rate in the country and, with no effective compulsory attendance law since the 1960's, many children never even entered the educational system. Reflecting changes in public attitudes and priorities, requirements for math and science instruction were relaxed almost to the point of non-existence; one unit each for math and science are presently required for high school graduation. Deficiencies in economic support at both state and local levels were major causes of inadequacy and even deterioration in much of the public education system. These deficiencies were the combined consequence of a poor economic base for generating funds and social and political behaviors which essentially were directed at sacrificing public education. This was particularly true following implementation of desegregation requirements. State expenditures, including those for salaries, equipment, physical plant, and all other educational needs remain among the lowest in the nation. In 1981-82, four states (three of them in the South) spent less per student for educational purposes than Mississippi. For the 1981-82 year, the average expenditure per pupil in the Southeast was $2,130. The average U.S. expenditure was $2,671. Mississippi averaged $1,863 per pupil.

In the areas of math and science, there are too few teachers, qualified or not. Aside from the persistent financial problems, major factors have been community attitudes toward the education system and the teaching profession, and the political and economic manifestations of these attitudes. Teacher's salaries in Mississippi, although consistently increased over the preceding decades, remain the lowest in the nation. The average salary for classroom teachers in the Mississippi public school system during the past year was $14,135. Most of them made less than that. The national average was $18,976. Teacher qualification and preparation lag far behind the need in math and science. The quality of instruction in the past has been severely hampered by low certification standards for teachers. Mississippi recently strengthened these standards, but the minimum acceptable score on the national standardized test was so low (3rd percentile) as to be of questionable value. There exists, too, the strong competition from businesses and industries which can offer up to multiples of base teaching salaries. The attractiveness of teaching as a career has diminished in Mississippi and the South as it has elsewhere, leaving science and math teacher education programs with few or no students. The response too often has been to lower standards for admission to the programs so that they may continue to exist. The number of graduates from science and math education programs at the eight state universities in Mississippi declined 71 and 84 percent, respectively, over the past ten years. This may be compared with 65 and 77 percent nationally. In the year 1982, there were eight math education and fifteen science education graduates certifiable for teaching in the state. Not all of them chose this career.

Federal funds are a critically important resource for all of public education in Mississippi. They have been since they were first made available. Approximately 25 percent of our public school expenditures are from federal sources. National science and educational policies, because they determine where, how, and when support will be provided, are of great importance even at local levels. Where state and local resources are inadequate, additional resources such as federal aid will make the difference between an adequate or an inadequate program. Of no less importance, of course, are state and local policies, and the support which they engender. Policies at any level which restrict or cut off funding will, in our case, severely limit educational oportunity. Policies at any level which have even the aura of being non-supportive of quality education may defer adequate support from other sources. When the executive branch of the federal government indicates its concern for public education by denying any responsibility and by refusing to become involved, should we expect strengthening of the resolve and the efforts of state and local leaders? From the perspective of the teachers and instructional administrators—that is, the people in the schools—the mode of administration of federal programs (or state programs, for that matter) is not a primary concern. Whether there be "new federalism" or direct federal control of expenditures is viewed as incidental. What is of primary importance is for whoever administers such funds to be aware of and responsive to the peculiarities of local needs. Such programs must be flexible enough to provide locally meaningful and effective application of whatever monies are available.

To reiterate, the nations's problems are our problems, but in Mississippi and the South they are more intense and of longer standing, and the interplay of factors which led to their development is somewhat different. Thus, our perspective may be somewhat different from the national one.

For amelioration of the problems in education in Mississippi, it is essential that there be, in addition to federal assistance, significant and well-directed changes at both the state and local levels, and that these changes encompass all of public education, from pre-elementary through graduate levels. Fortunately, this has begun. Critical, now, is that it continue. It is of major significance that the successful pressure for change came not from the political, business, or education establishment, but from individual citizens who, because their children are, were, or will be students, or for other reasons, wanted public education in Mississippi to be meaningful and in tune with the modern world. It was they who communicated persistently and persuasively with their state senators and representative until a recalcitrant legislature acted. The Governor's leadership provided the initiative and the proposed legislation. The Governor's Office conducted a series of local citizens meetings throughout the state, the theme being that if they, the citizens, wanted to have improvement and progress, they could bring it about. The Governor personally spoke and answered questions at each meeting. An indication of citizens' interest was the attendance. At the first meeting an audience of about 600 was anticipated. the crowd numbered over 2,000.

Another factor—a most important one—was the role of the news media within the state. Public awareness and understanding of the issues involved was without doubt strongly enhanced by the continued reporting and discussion of the quality, or lack thereof, of public education in the state by newspapers, radio, and television. This began well before the legislative session and included many editorials in support of the proposed legislation, some against, and many, many letters to the editors. In other words, the issues were discussed publicly, well and at length. The Jackson Clarion-Ledger was awarded a Pulitzer prize for its coverage and editorial treatment of this process.

The outcome of this movement, the Education Reform Act of 1982, will among other changes, (1) mandate statewide kindergartens and a reading aides program. (These aides will assist individual classroom teachers in teaching reading to grades 1-3; this will allow more individual attention and specialized instruction.) The Act will (2) require enforceable school attendance; (3) provide teacher pay increases; (4) adjust pay scales; (5) establish a performance-based school accreditation system. (This is possibly a revolutionary concept, in that accreditation will be based upon such things as the material actually taught to students, their acquistion of it, and the coherence of instruction between classes and grades, rather than merely such readily countable items as number of books in the library or numbers of students per teacher.) The Act will (6) begin a program of school consolidation which will improve local economic support; (7) revise teacher certification procedures; (8) mandate local participation in staff development; (9) establish a new state board of education with new and broad powers over school management, school accreditation, teacher training and certification, and educational improvement. (This should be contrasted with the current board: the board presently consists of the State Superintendent of Education, the Attorney General, and the Secretary of State, all elected officials who may have little interest and less time for educational matters; the new board will consist of nine members, five appointed by the Governor, two by the Lieutenant Governor and two by the Speaker of the House for nine-year terms.) The Act will (10) create a School Executive Management Institute, which is designed to keep principals and instructional administrators up-to-date with respect to curriculum and instructional developments. They will be required to participate. Also provided are funds to support teacher training in critical areas such as math and science. This will be a program of forgivable loans, available to science and math education majors, and to experienced teachers who wish to become qualified in these areas. In Mississippi, just such a beginning was required before any meaningful or lasting improvements could be made in science, math, or engineering education.

Another similarly controversial change directed toward improving education at both secondary and higher levels is the new admissions requirement set by the Mississippi Board of Trustees of State Institutions of Higher Learning. All entering first year students at any of the eight public universities in 1986 must have, among other requirements, three units of math and three units of science. (Also required are four units of English, two and one-half units of social studies, and one unit elected from math, science, or a foreign language. It is noteworthy that this is in essence one of the recent recommendations by the National Commission on Exellence in Education.) Similar changes are appearing in other southern states. In Mississippi it is anticipated that the eventual result will be an upgrading of the secondary education program to the point where entering freshmen will have had sufficient education to begin their freshman year at least at a freshman level and that all students will benefit from a general enhancement of quality offerings. It is feared by many that, without an immediate and substantial infusion of financial support and qualified teachers, the most immediate result will be education by subterfuge—that is, the renaming of courses to meet (on paper) the new requirements, without change in course content. It is feared also that there will be a dilution of effort because of the suddenly increased number of students in the required classes, to the point where quality teaching becomes impossible. In other words, we are meeting our crisis, but it will not be done without great effort and sacrifice. We are putting forth the effort, and anticipate the sacrifice. Nevertheless, federal support—material and moral—could mean the difference between coming in sight of our goals and actually achieving them.

Among the controversies most likely to have significant effects upon science education in Mississippi is one concerned with the local control of schools. There are 153 local school districts in Mississippi, revised downward in the 1950's from 2,094. Still, many of these are comprised of rural areas with insufficient tax bases to provide adequate local financial contributions to their schools, and with too few students to attract enough state funds to provide physical facilities, teachers, course variety, and teaching supplies and equipment necessary for an acceptable program. The courses which are usually the first to suffer or to be eliminated are in science. Fortunately, the education reforms recently enacted address this problem directly. Nevertheless, the changes necessary for effective educational improvements will not be easily arranged; local control carries political power, or at least implies it, and it is often regarded as a sacrosanct heritage.

Another issue which potentially is direct and substantial in its effect upon science education in public schools in Mississippi is the effort to disguise religious doctrine as scientific tenet. An initial attempt to have creationism legally mandated as part of the public school science curriculum passed in the state senate but failed in the house last year. A similar measure never reached a vote in the house this year. However, there remain in many quarters strong sentiment and substantial support for this movement. For example, the failure to consider a creationism bill was accompanied by a failure to authorize funding this year for our State Textbook Commission, leaving the State unable, for now, to select or purchase new textbooks.

The Mississippi Academy of Sciences was founded in 1930. As with other state academies, its purposes include the furtherance of science and science education. Various activities have been undertaken over the years to promote these aims. A current activity of longstanding is sponsorship of the Junior Mississippi Academy of Sciences.

The Junior Academy arranges presentations of research reports at an annual meeting. Superior reports are recognized at the Mississippi Academy of Sciences' annual meeting, and presentation by an overall winner is sponsored by the Mississippi Academy at this meeting. We dispense, as they are available, funds to support student research. The Academy for the past three years has co-sponsored with the Governor's office a workshop conference, the Governor's Colloquium on Science, Engineering, and Technology. Two selected senior students from each of the state's colleges and universities meet with scientists and experts from various fields to discuss Mississippi's, and their, future. In this way we are attempting to disperse among the state's future leaders and decision makers an awareness of the future, its possibilities and limitations, and the necessity of their being prepared for it. The Colloquium theme this year was, "Using Mississippi's Natural Resources in an Era of High Technology."

The Mississippi Academy of Sciences opposes the teaching of non-science or pseudoscience in the guise of science, and opposes the development of specific curricula by legislative fiat. The MAS Board of Directors last year adopted and promulgated a resolution to this effect. The Academy Board also published a resolution in support of the Board of Trustees of State Institutions of Higher Learning in its efforts to upgrade science and math preparation of high school students. The Academy recognizes by special awards presented at its annual convention outstanding contributions by Mississippi scientists and engineers. An additional award will be made beginning next year for outstanding contributions to the teaching of science at primary and/or secondary levels. By these and other means the Mississippi Academy of Sciences lends its support to quality math and science education in the state.

Historically and currently the MAS has been very much concerned about science, engineering, and math education in Mississippi. Various plans and proposals for assisting schools, communicating the need for education to the citizenry, or otherwise providing some ameliorating influence have from time to time been considered. Some have been successfully implemented. However, our organization suffers from the same problem as our state—insufficient financial resources—and also from total dependence upon volunteer donations of time and energy. Therefore, we are now concentrating upon maintaining our existing programs, letting our voice be heard in support of quality public education (particularly with respect to math, science, and engineering) whenever and wherever appropriate, and on locating and availing ourselves of opportunities to increase our contribution. State academies of science, we feel, are by and large in a unique position to involve the citizens of their states in effective activities at local levels. Usually they are the only organizations with existing statewide membership drawn from all areas of science and technology. They have the potential for developing in a relatively short time state-wide efforts which may at the same time be very cognizant of and responsive to local needs, and which may involve the various facets of a community, from the teachers in the schools to the businesses, industries, and political entities. This is the direction in which we are trying to move.

The resurgent recognition at national and state levels of the value of science to the country and to the general welfare of humankind is gratifying. The promise of strong support for quality math and science education is encouraging. However, when considering historical precedents, such as the resurgence of support following Sputnik in the '50's, one tends to be apprehensive about the depth of popular and political understanding of the role and promise of science in human affairs, and about the persistence of support. The Mississippi Academy of Sciences is working to enhance public understanding and to promote the persistence of support for science, math, and engineering education.

The NAAS/AAAS Symposium: The Crises in Science and Mathematics Education, 1983.

GOALS FOR SCIENCE EDUCATION

ANNA J.HARRISON

President-Elect AAAS
Mount Holyoke College
Department of Chemistry,
South Hadley, Massachusetts 01075-1483

ABSTRACT

Much of the discussion of the crises in science, mathematics and engineering education is in terms of the exposure of individuals to these subjects during the pre-college years. Much less attention is given to the nature and quality of that educational experience. In order to get on with the business of improving education, more attention must be given to goals. What do we seek to enable students to accomplish? To me, the fundamental objective of science eduation is to enable students to extend their knowledge and understanding of scientific phenomena and technology throughout their lives in order that they more fully enjoy and participate in an increasingly technological society and I find it an interesting and rewarding exercise to identify the more immediate goals which provide the mechanisms to enable students to achieve this objective.

To me, the resolution of the crises in science and mathematics education is a matter of values and consequently a matter of priorities. If students, parents, teachers, scientists, engineers, employers, employees, legislators, governors and presidents place a high value on quality education, I have no doubt that we will manage to evolve the goals, the strategies and the mechanisms to achieve quality education. If we really want high quality and appropriate education, in time, we will have high quality and appropriate education. What is appropriate education?

First, a few general considerations.

The education of an individual is the consequence of how that individual responds to a great multiplicity of enabling experiences, some provided to the individual and some created by the individual.

It is highly probable that most of what an individual knows and understands about science, engineering and technology at age 35 has been acquired following the formal academic years. This is largely a consequence of the rate of extension of scientific and engineering knowledge and the rate of technological innovation. It is also highly probable that how much that individual knows and understands about science, engineering and technology is highly dependent upon the experience with science, engineering and technology during the academic years.

Meaningful goals for science education during the academic years can only be framed in terms of the concept of the academic years as the base for a lifelong learning experience.

I find it helpful to think of academic education as the process of creating and making available enabling experiences. Academic institutions provide the people, the facilities and the environment to create and make available enabling experiences, including research experience. Academic institutions also provide incentives and a bit of coercion to encourage the participation of the student in a world filled with competing attractions and demands.

I also find it useful to consider science to be a process of investigation of physical, biological, behavorial, social, economic and political phenomena, and the body of knowledge derived from those investigations. *Process* is used here to include all of the things a scientists does from the definition of the problem to the assessment of the uncertainty associated with the data base acquired and the array of concepts derived from the study. *Process* includes the selection of the methodology and the instrumentation to be used, the delineation of the protocol for the study, the execution of the study, the collection of the data, the reduction of the data, the development of constructs, and the testing of both the data base and the constructs against other relevant data bases and concepts. *Process* is *not* used here as a synonym for *scientific method.* The integrity of scientific knowledge is, of course, derived from the integrity of process from which the knowledge was derived and the integrity of scientific knowledge always remains open to question and subject to test.

Much of science education has focused on the body of knowledge. To provide the base for a lifelong experience in learning, I believe more attention must be given to process. This conclusion is based upon experience in endeavoring to communicate the state of technical knowledge in specific areas to decision makers who have limited backgrounds in science. If they understand to some degree the process of investigation, including the assessment of the uncertainty of the results, it is comparatively easy to bring these individuals up to speed. If they do not understand process, including the assessment of uncertainty, it is extremely difficult to communicate to them the current status of scientific and technological knowledge.

My conclusion is that the early academic experience with a science should enable the individuals to do a number of things. These include

- enable the individual to discover phenomena,
- enable the individual to investigate phenomena,
- enable the individual to have experience with the assessment of the uncertainties associated with an investigation,
- enable the individual to have experience drawing generalizations and rationalizing phenomena,
- enable the individual to develop a level of competence with selected skills,
- enable the individual to discover his or her capacity to extend his or her knowledge of science independent of the classroom environment, and

- enable the individual to discover that he or she enjoys and derives satisfaction from the extension of his or her own knowledge and understanding of things scientific.

The pious hope is that individuals will continue to extend their knowledge and understanding of science, engineering and technology throughout their lifetimes.

These goals were introduced here in terms of the early academic experience. Actually, they are equally applicable to all levels of academic education, including graduate education. The differences are simply those of appropriate level and sophistication. These goals are also appropriate to many institutions other than educational institutions. These include the family, youth organizations, clubs, museums, expositions, mass media industries, etc.

The academic years are, of course, a unique period in the development of the individual and what takes place during those years is highly significant to the lifelong learning experience and to the participation of that individual in the resolution of societal issues. Many of today's issues relate to our endeavors to enhance the benefits to society that can accrue from the products of technology while at the same minimizing the burdens of technology on society and to our endeavors to attain a balance in the distribution of benefits and burdens of technology throughout society. Knowledge and understanding of both the benefits and the burdens inherent in the use of science and technology are essential to the attainment of a realistic environment for science, engineering and technology, an environment that fosters the sustained growth of science and the balanced use of technology in the services of society.

This continued learning experience is also essential to sustained participation in many areas of employment and specific consideration should be given to the academic experience of several subsets of the student population. Four of these subsets are identified here:

1) the individuals who will seek to go directly from high school to employment in industries and businesses involved in high technology either as a producer or as a user,

2) the individuals who will seek to go directly from the two-year colleges into high technology industries and businesses,

3) the individuals who will enter professions such as law, business and journalism and become participants in the formulation of institutional and public policies, and

4) the individuals who will become scientists and engineers.

The goals previously stated are relevant. The level of sophistication and the weighting would, however, be different.

The NAAS/AAAS Symposium: The Crises in Science and Mathematics Education, 1983.

THE CRISIS IN SCIENCE EDUCATION: AN OVERVIEW

F. James Rutherford

Chief Education Officer
American Association for the
Advancement of Science
Washington, D.C.

ABSTRACT

The current severe crisis in science education in the United States can be seen to stem from the cumulative effects of several chronic disabilities in our system. These include: undefined national purposes in science education; the low status and poor working circumstances of science teachers; an unresponsive science teacher supply and demand apparatus; structural weaknesses in the formal education system; a lack of modern content and technique; a weak research and development base for science learning and teaching; and the separation of science teachers from the larger scientific community. To change this it will be necessary to initiate vigorous action programs in the private and public sectors and at the federal, state and local levels. Some specific recommendations will be offered.

NAAS BOARD MEETING

May 28, 1982; 9:20 a.m.
Horace Rachman Educational Memorial Building
Detroit, Michigan 48202

1. The meeting was convened at 9:20 a.m. by president Frank Starr - attendee list attached.
2. Minutes of business meeting of January 5, 1982 were approved as distributed.
3. Editing Progress on the A.A.A.S. symposium proceedings.

   Dr. Robert Hanson plans to have edited copy of the A.A.A.S. symposium on "Science and Belief" ready to go back to the authors by July 1. The final date for having the camera ready copy will be dependent upon when these are returned from their respective authors. However, it is anticipated that the camera ready copy of the symposium will be ready during the fall of 1982.

   Dr. Joseph Dasbach will confer with A.A.A.S. office regarding the details of editing and publishing the proceedings. There was discussion of the possible availability of $500 ± that would normally be spent for the publication of the proceedings from the N.A.A.S. Since the proceedings and the handbook of the N.A.A.S. will be printed as one copy, there should be some additional funds.
4. Old Business. No items were called to the floor.
5. Follow-up—Discussion of A.A.A.S. Science Education and Coalition Conference.

   Those attendees who were at the conference called by the National Association of Science and Engineering and the A.A.A.S. were Paul Sullivan, Joseph Dasbach, Lynn Elfner, and Robert Hanson. The latter meeting was called by Dr. F. James Rutherford. Copies of the A.A.A.S. publications 1) Education in the Sciences: A Developing Crisis; and 2) Education in the Sciences: A.A.A.S. Affiliated Organizations Directory were distributed. Special attention was called to page 8 of the bulletin, "A Developing Crisis" regarding the part that might be played by N.A.A.S. and their respective state academies. It was suggested that President Frank Starr write a letter to the newly formed Science Education Commission and also to the President of the State Academies regarding involvement of programs with the commission. Motion was made by Lynn Elfner and seconded by Ertle Thompson that N.A.A.S. should formulate an action program in keeping with the intended assigned duties of the commission. Motion passed with unanimous vote.
6. AJAS Considerations by Bill Schmitt and Bobby White.

   The following items were distributed for information and consideration by the Board of Directors: a) AJAS Brochure; b) Proposed informational guide for the AJAS meeting, May 1983, Detroit, Michigan; c) Compressed data overview of the A.A.A.S. 1983 annual meeting.

   Bill Schmitt had requested comments regarding the A.J.A.S. Brochure prior to the directors meeting. There were a few return comments. Since the brochure will involve the A.A.A.S., Joe Dasbach will return the brochure dummy copy to Lynn Elfner by June 9. It is anticipated that the brochure will be published and mailed out by July 15.

A.J.A.S. expenses of the previous year were discussed. N.A.A.S. Board commended the directors for the outstanding meeting in Washington, D.C. This is the first time that A.J.A.S. has been able to show a financial surplus. Motion was made by Lynn Elfner that the N.A.A.S. establish a student awards endowment with the surplus funds from the 1982 A.J.A.S. meetings. Three hundred dollars will be retained by A.J.A.S. directors for current expenses and the remainder of the surplus will be turned over to the treasurer of the N.A.A.S. for starting the endowment fund. The motion was seconded by Lee Bolen. The motion passed with unanimous vote.

Bill Schmitt discussed the performance time table for 1982-83 as per the distributed materials. It was pointed out that those students who are accepted late for the May meeting would need to have their abstracts published in a supplementary publication. The Board recommended that authorization be made to plan on banquet cost of $15 per student and that this amount might be extended $2 more if necessary. The program for the A.J.A.S. Banquet, May 1983 will be Frank Starr with the topic "Favorite Science Demonstrations." The banquet will be at 5:30 on Friday evening in the Rachman Memorial Building. Other comments which were made regarding the reception and banquet were that Joe Dasbach will request $500 from the A.A.A.S. for the reception costs. Joe Dasbach also suggested that Mr. Schmitt write A.A.A.S. asking for subscriptions for Science '83. Paul Sullivan recommended that as many of the details as possible should be turned over to the local committee since they might be able to arrange for such things as a free school bus.

7. Ertle Thompson distributed copies of the treasurers report showing $4,495.68. cash on hand. Lee Bolen made a motion that $3,000 be placed in 90 days interest bearing certificates. It was seconded by Dick Raridon. Motion passed with unanimous vote.
8. Symposium for 1983 A.A.A.S. meeting.

   It was the consensus of the group that the program committee would abide by the A.A.A.S. August 1 deadline for submission of the details requested for symposium topic and organization. It was suggested that the symposium would be in line with some area of National Crisis in secondary Education—Reaction at State and Local Levels.
9. New N.A.A.S. stationery.

   Frank Starr will assume the responsibility of designing and printing new stationery.
10. Image promotion for N.A.A.S.

    Motion was made by Elfner. A brochure and/or a logo would be developed that can be used by all academies and that there be further development of a display exhibit for N.A.A.S. use. Motion passed with unanimous vote.

    Frank Starr will investigate the possibility of some companies sponsoring a medal for presentation by local academies to top students in each of the schools.
11. Formation of Ad-Hoc committee to work with coalition commission.

    The committee is to be composed of Hanson, Elfner and Sullivan plus three others to be selected by Lynn Elfner. This committee is to work with the N.A.A.S. program committee for the purpose of defining the role and strategies of academies, as they work with the coalition commission. It was suggested that the Ad-Hoc committee meet during Fall 1982 at Columbus, Ohio.

12. A.J.A.S. director workshop is to be set up by the program committee. The resource personnel for the workshop will be Paul Sullivan, Bill Schmitt, and Jim Edoff.
13. Notes (understandings arrived at outside from the board meeting).

Art Hughes will put together the combined Directory-Handbook and put proceedings in one volume. Lee Bolen will pass all of the proceedings of Junior Academy on to Art Hughes. Joe Dasbach stated that the Directory-Proceedings should be out by September. Frank Starr will send the committee structure and memberships list to Art Hu[illegible]es for inclusion in the handbook.

Time Table and Responsibilit[illegible]

The question of responsibilities of each member of the board and in the time tables for disposing of many of the duties was discussed. Lee Bolen pointed out that such a time table was available from earlier board minutes. Lee will be sending a copy of this portion of earlier minutes to each board member for revision to the new schedule of the A.A.A.S. After the board has had a chance to include their suggestions, a new timeline will be set up and distributed.

Submitted by ____________________

Dean A. Rosebery
Secretary
June 4, 1982

ATTENDEES - NAAS DIRECTORS MEETING

May 28, 1982

Bill Schmitt
c/o COSI 208 E. Broad St.
Columbus, Ohio 43215
Office - 614—228-6374
Home - 614-855-7548

Bobby White
c/o COSI 208 E. Broad St.
Columbus, Ohio 43215
Office - 614-228-6374
Home - 614-224-6510

R. J. Raridon
111 Columbia Drive
Oak Ridge, TN 37830
Office - 615-574-5444
Home - 615-483-4843

Paul Sullivan
JETS Inc.
345 East 47 St.
New York, NY 10017
Office - 212-705-7690
Home - 212-237-0655

Joseph M. Dasbach
Director of Science Education
AAAS
1776 Massachusetts Avenue, NW
Washington, DC 20036
Office - 202-467-4464
Home - 301-588-1160

Lynn E. Elfner
445 King Ave.
Columbus, OH 43215
Office - 614-424-6045
Home - 614-363-2244

Lee N. Bolen
Physical Acoustics Laboratory
University, MS 38677
Office - 601-232-5840
Home - 601-234-6134

Ertle Thompson
Ruffner Hall, Univ. of Virginia
Charlottesville, VA 22903
Office - 804-924-3730
Home - 804-293-7330

Robert W. Hanson
Box 868
Cedar Falls, IA 50613
Office - 319-277-2022
Home - 319-266-8245

Dean Rosebery
Division of Science
Northeast MO State University
Kirksville, MO 63501
Office - 816-785-4599
Home - 816-665-9193

Frank Starr
Science Coordinator
Waterloo Community Schools
1516 Washington Street
Waterloo, IA 50702
Office - 319-233-5281
Home - 319-266-4768

NAAS EXECUTIVE BOARD MEETING

May 27, 1983; 2:00 - 5:30
Detroit Engineering Society Building, 100 Farnsworth Street
Detroit, Michigan

1. The meeting was called to order by the President, Frank Starr, with ten members present (attendee list attached).
2. Minutes of the May 28, 1982 Executive Board Meeting were discussed with Lynn Elfner making a motion to approve the minutes, George Shoffstall seconded. Motion was unanimously accepted.
3. *AJAS Report.* Mr. Bill Schmitt discussed the present financial condition of the AJAS funds. He submitted an approximation report (Appendix A). He will be filing a new report as soon as all of the bills are in from the present conference. He expressed a concern that the approximately $1,250 surplus be invested for endowment funds which will be used for the support of AJAS students. Motion was made by Elfner to approve the report, seconded by Robert Hanson. The motion passed unanimously. Mr. Schmitt reported that 50 students had registered to date; however, provisions were made for inviting other students from the Detroit School System. He stated that the NAAS might want to consider formulating more definite stipulations as to which students were eligible for participation in the program. The AJAS brochure did not get printed; however, it has been edited by both Mr. Schmitt and Elfner. Lee Elfner made the motion that we commit the NAAS to the printing of an AJAS brochure. It was seconded by Ertle Thompson, Motion passed unanimously.
4. *Treasurer's Report* - Dr. Ertle Thompson (see Appendix B). A financial statement is attached showing total receipts as of 5-23-83 as $7,885.32. Expenditures of $3,329.97, leaving a cash on hand total of $4,645.35. Concern was expressed regarding the high cost of printing the Proceedings, Directory, and Handbook. The board members were asked by the president to study alternatives for the publication and should be in a position to discuss them at the next executive board meeting. President Starr appointed a committee to report back on format for the standardization of information collected from the state academies for the handbook. Appointees to the committee are: Hanson, Bolen, Raridon, and Rosebery.
5. *Archivist's Report* by Lynn Elfner. Motion was made to accept the Delaware Academy of Science request to become a member of NAAS. This will be contingent with their becoming affiliated with the AAAS. A bill will be sent to them after they become affiliated. Mr. Elfner submitted a copy of the report of The Committee on Appropriate Roles and Strategies for Science Academies in Relation to the AAAS Coalition for Education in the Sciences. The committee members were: Lynn Elfner, Robert Hanson, Dudley Peeler, Jr., LeRoy Lee, Paul Sullivan, and Walter A. Cory, Jr. The committee report was summarized by the six roles that the NAAS should assume. Robert Hanson made the motion that we accept the report of the committee, seconded by George Shoffstall, motion passed unanimously. Mr. Elfner had been charged with the responsibility of preparing a science academy leaflet. Mr. Elfner is to have the leaflet published at a charge of $250 to the AAAS. T[illegible]ith the understanding that each state would be privileged to order additiona[illegible]es if they want them for their members. The archivist also discussed the poor quality of

the Proceedings, Directory, and Handbook as published by the AAAS. Dr. Dasbach stated that the AAAS is not satisfied with the quality of the publication because of the lack of time for proper editing and the handling of copy.

6. *AAAS Report.* Dr. Joseph Dasbach reported that 16 research grants had been made. The financial payments for the grants ranged from $500 to $1,500 with a mean of $855. The Board of the NAAS was sent a special brochure printed by the AAAS regarding the Leonardo DiVinci television special. These brochures were for distribution to the state academies. A career opportunities booklet was made available to the members. He suggested that symposium topics should be presented for the New York AAAS conference. The topics suggested were:
   a. Acid Rain
   b. Turf Protectionism vs Excellence in Science Education
   c. Non-Traditional Approaches in Science Education.
   d. In Search of Excellence in Science Education
7. *Symposium Publication.* Dr. Robert Hanson reported that some problems would need to be cleared up before the final publication of last year's symposium on Science and Creation. A majority of these are details regarding clearances and editorial work by each of the contributors. The symposium is to be published by MacMillan. A copy of the preface and table of contents is attached.
8. *President's Report.* Mr. Frank Starr reported on the Presidential Memoranda which had been sent to all members of the Board and members of the NAAS. The emphasis had been on communications with information pertinent to the NAAS and AAAS. The president also commented about the action of the steering committee as discussed earlier under the report by the archivist. President Starr stated a need for updating the by-laws. He stated that any changes in the by-laws would need to be passed by the delegates at the next annual meeting and they would take effect one year later.
9. *Past-President's Report.* George Shoffstall reported that the symposium "The Crises in Science and Mathematics Education: Perspectives at the National, State, and Local Level" would be in the Marquette A Room from 9:00 a.m. to 12:00 on Saturday, May 28. The members of the symposium are: F. James Rutherford, Ertle Thompson, Laurel A. Grotzinger, John J. McDermott, Walter Cory, Dudley F. Peeler, Jr., and Anna J. Harrison. Dr. Shoffstall gave a report of the nominating committee. The report is as follows: Director AJAS - Mrs. Dallas Cocke (VA); President-Elect - Dr. Dean Rosebery (MO); and Secretary - Dr. Shyamal Majumdar (PA). The motion was made to accept the report of the nominating committee and the slate. The motion passed with one abstention.
10. *President Elect Report.* Dr. Lee Bolen submitted a timetable for performance of various duties which are to be performed by the officers of the NAAS. This report is based upon earlier meetings of the AAAS and he will be modifying them to meet the requirements of the May meetings of the AAAS. Dr. Bolen reported that appointments to committees will be announced at the next board meeting.

Submitted by ____________________
Dean A. Rosebery, Secretary
2 June 1983

NAAS
ATTENDEES AT EXECUTIVE BOARD MEETING
May 27, 1983

Frank Starr
1115 West 12th
Cedar Falls, IA 50613
Home - 319-266-4768
Office - 319-233-5281

Lee N. Bolen
Acoustics Lab
University, MS 38677
Home - 601-234-6134
Office - 601-232-5401

George C. Shoffstall
West Penn Hospital
4800 Friendship Avenue
Pittsburgh, PA 15224
Office - 412-578-6884

Dean A. Rosebery
Division of Science
Northeast Missouri State
Kirksville, MO 63501
Home - 816-665-9193
Office - 816-785-4599

Ertle Thompson
Ruffner Hall
University of Virginia
Charlottesville, VA 22903
Home - 804-293-7330
Office - 804-924-0840

Robert W. Hanson
P.O. Box 868
Cedar Falls, IA 50613
Home - 319-266-8245
Office - 319-273-2022

Lynn E. Elfner
445 King Avenue
Columbus, OH 43201
Home - 614-363-2244
Office - 614-424-6045

Bill Schmitt
c/o COSI
280 East Broad Street
Columbus, OH 43215
Home - 614-855-7548
Office - 614-228-6374

Richard J. Raridon
111 Columbia Drive
Oak Ridge, TN 37830
Home - 615-483-4843
Office - 615-574-5444

Joseph M. Dasbach
Director of Science Education
AAAS
1776 Massachusetts Avenue, NW
Washington, DC 20036
Home - 301-588-1160
Office - 202-467-4464

Appendix A
1983 AJAS - Detroit, MI

BALANCE 1/83 Fund		$1250.00
1983 (Approximate)		
Banquet Tickets (40 x 20)		$ 800.00
Registration Fees (50 x 75)		3750.00
AAAS Sponsorship		500.00
NAAS Sponsorship		400.00
	Income Total	$5450.00
1983 Expense (Approximate)		
Banquet		$1500.00
Science Center (Donation $500.00)		800.00
Mixer and Breakfasts		800.00
T-Shirts		500.00
Artwork and Certificates		200.00
AAAS Registration		750.00
Picnic		300.00
Office Expenses		800.00
	Expense Total	$5650.00
	Balance	−$ 200.00
1983 Housing		
Income		$4459.00
Expenses		4700.00
		−$ 241.00

Appendix B
Treasurer's Report, Detroit, Michigan, May 27, 1983

NAAS 1982 Deposits
(Investors Savings and Loan, Charlottesville)

1/25	Balance from Am. Bank, Huntsville, Texas	$1814.19	
	Sc. Inst. for Pub. Inf. NY, NY for Directory	5.00	$1,819.19

2/5	Alabama Academy	72.50	
	Am. Inst. of City of NY	25.00	
	Idaho Academy	18.60	
	Illinois Academy	100.00	
	Iowa Academy	140.00	
	Maryland Academy	391.20	
	Montana Academy	24.00	
	New Orleans Academy	15.00	
	North Dakota Academy	42.10	
	Oregon Academy	20.00	
	St. Louis Academy	132.50	
	South Carolina	58.60	
	Southern California Academy	40.00	
	Texas Academy	90.00	
	West Virginia Academy	30.00	
	Virginia Academy	155.00	
	Pennsylvania Academy	70.50	1,425.00
3/3	Arizona/Nevada Academy	37.50	
	Chicago Academy	90.00	
	Colorado/Wyoming Academy	30.00	
	Georgia Academy	57.20	
	Hawaiian Academy	39.00	
	Indiana Academy	104.10	
	Kansas Academy	50.00	
	Minnesota Academy	60.50	
	Mississippi Academy	93.60	
	Tennessee Academy	70.00	
	Vermont Academy	20.90	652.80
3/31	Oklahoma Academy	80.00	
	Michigan Academy	112.50	
	Wisconsin Academy	142.80	
	UCSD Sc. Engineering Library	6.00	341.30
5/11	Arkansas Academy	25.00	
	Kentucky Academy	60.00	
	Missouri Academy	93.30	
	Nebraska Academy	65.00	
	Ohio Academy	160.00	403.30
5/11	For NAAS Handbook and Directory		
	State of Arkansas	$ 5.00	
	Thomas R. Houston	5.00	
	Blackwell North America, Inc.	10.00	
	Mary-Margaret Pinckard	5.00	
	Rollins College	5.00	
	Maryland Academy	5.00	$ 35.00

5/26	Princeton University	10.00	
	Southern Illinois University	10.00	20.00
5/26	Utah Academy (dues)	36.60	
	Florida Academy (dues)	62.50	99.10
2/14	Interest	7.57	
3/14	Interest	13.57	
4/14	Interest	16.90	
5/14	Interest	17.43	55.47
6/14	Interest	20.14	
7/14	Interest	19.77	39.91
7/22	North Carolina Academy	120.00	
	South Dakota Academy	17.00	
	Univ. of Illinois Library	5.00	
	Univ. of Wisconsin, Eau Claire	5.00	
	Albert Henderson	5.00	
	William Barrett, Ohio Academy at Alabama	5.00	157.00
10/04	Louisiana Academy	80.00	
	New Jersey Academy	67.90	
	New Mexico Academy	14.80	
	Washington Academy	115.00	
	Richard Strimple, Ohio Academy	5.00	282.70
11/15	Idaho State University	5.00	
2/9/83	San Antonio Community College	5.00	
	Boston Museum of Science	5.00	
	Grand River Books	5.00	
5/17/83	Blackwell North America	5.00	
	N.A.B.T.	5.00	30.00
7/14/82 to 4/14 '83	Interest	206.25	206.25
5/17/83	Alabama Academy	$ 76.40	
	Arizona/Nevada	55.00	
	Chicago	90.00	
	Colorado/Wyoming	30.00	
	Florida	62.50	
	Georgia	43.70	
	Hawaii	40.30	
	Idaho	17.50	
	Illinois	100.00	
	Indiana	101.60	
	Iowa	140.00	

	Maryland	410.00	
	Michigan	107.20	
	Mississippi	81.70	
	Montana	22.00	
	New Jersey	65.60	
	New Orleans	10.00	
	North Dakota	43.80	
	Oregon	23.10	
	St. Louis	132.50	
	South Carolina	40.20	
	Southern California	40.00	
	Tennessee	80.00	
	Utah	40.00	
	West Virginia	30.00	
	Wisconsin	131.80	
	Vermont	20.90	$2,035.80
5/25/83	Minnesota	58.50	
	Pennsylvania	69.00	
	Virginia	155.00	282.50
Total Receipts as of 5/25/83			$7,885.32

RECORD OF NAAS 1982 CHECKS WRITTEN

#1	2/5 George Shoffstall	Board Meeting expenses	$100.00
#2	2/5 Arthur E. Hughes	Board Meeting travel	100.00
#3	2/5 Arthur Hughes	Dues mailing & directory information	54.48
#101	3/3 Robert Hanson	Board Meeting expenses	100.00
#102	3/9 Recorder of Deeds, D.C.	Annual Report	1.00
#103	10/4 Iowa Academy	Xerox, postage, phone, and clerical	226.87
#104	11/2 Iowa Academy	Bob Hanson travel to Washington, DC	256.00
1983			
#105	2/8 Iowa Academy	Publication and office cost	361.43
#106	3/30 Recorder of Deeds, DC		1.00
#107	4/18 Iowa	Xerox, clerical, postage, phone	233.75
#108	5/11 AAAS for 1982-83	1982-83 Directory and Proceedings	1,494.74
#109	5/16 Arthur Hughes	Directory and Handbook Expenses	304.70
	Charge for printing of checks		6.00
Total Expenditures			3,239.97
Total Cash on Hand as of 5/25/83			$ 4,645.35

Treasurer's Report, Detroit, Michigan, May 27, 1983

Ertle Thompson, Treasurer
May 27, 1983

ANNUAL MEETING OF THE DELEGATES TO THE NAAS

May 28, 1983; 12:30 p.m.
Marquette A Room, Westin Hotel
Detroit, Michigan

1. The meeting was convened by the president, Frank Starr, in the Marquette A Room of the Westin Hotel at 12:30 p.m. on May 28, 1983.
2. The president discussed the symposium which had just been presented under the direction of past-president George Shoffstall. The topic was "The Crises in Science and Mathematics Education: Perspectives at the National, State, and Local Level". The president then discussed possible symposia for next year which will be under his supervision. Some areas under consideration are:
   a. Acid Rain
   b. Turf Protectionism vs Excellence in Science Education
   c. Non-Traditional Approaches in Science Education
   d. In Search of Excellence in Science Education

   The president briefly discussed the necessity for bringing the constitution up to date and that a committee would be making recommendations for consideration at the next annual meeting and that these would then take effect one year after their approval.
3. *Secretary's report.* The secretary discussed the minutes from two executive board meetings, one from May 28, 1982, the other from May 27, 1983. The minutes stand approved as discussed; however, copies of the minutes for the two executive board meetings together with minutes of this meeting will be distributed to those attendees of the annual meeting.
4. *Treasurer's Report.* Dr. Ertle Thompson passed out the balance sheet for the previous year. These were the same as the financial reports presented at the executive board meeting on May 27. Dr. Thompson referred to the dues which had not been sent in from member academies.
5. *Past-President's Report.* Dr. George Shoffstall announced that the recipient of the outstanding award was Dr. Joseph Dasbach and that the award had been presented Friday evening, May 27 at the joint NAAS/AJAS banquet.

   Further duties of the past-president is to chair the nominating committee. He presented the same slate of officers as was approved and recommended by the executive board. The slate of officers were: Director AJAS - Mrs. Dallas Cocke (VA); President-Elect - Dr. Dean Rosebery (MO); and Secretary - Dr. Shyamal Majumdar (PA). A motion was made and seconded that the slate of officers be elected by acclamation and the motion passed.
6. *Archivist's Report.* Mr. Lynn Elfner stated that the Delaware academy had been approved as a member of the NAAS subject to their becoming affiliated and accepted by the AAAS. Mr. Elfner also referred to the availability of the academy leaflets for member academies. Mr. Elfner then submitted a report of The Committee on Appropriate Roles and Strategies for Science Academies in Relation to the AAAS Coalition for Education in the Sciences. The committee report was summarized by six roles that NAAS and its respective academies should assume. The six roles were presented in the report through various examples and strategies for

achievements. The six roles are:

   1. provocative criticism
   2. adaptation of existing programs
   3. assessment of state and local conditions
   4. public relations and visibility for the problem
   5. coordination at state and local level
   6. dissemination of information

7. President Frank Starr transferred the meeting to Dr. Lee Bolen, the new president. Dr. Bolen stressed encouraging more people to attend NAAS, a stronger cooperation with the AAAS, and continued leadership with the AJAS. Dr. George Shoffstall was then appointed to replace Dr. Richard Raridon as a council delegate to the AAAS. President Bolen also stated that the new Proceedings and Handbook should be published by September 1.

There being no further business, the meeting was adjourned at 1:20 p.m.

Submitted by ____________________
Dean A. Rosebery, Secretary
2 June 1983

ATTENDEES AT THE NAAS ANNUAL MEETING
May 27, 1983

David D. Moran Sigma Xi-Scientific Research Society 345 Whitney Avenue New Haven, CT 02511	Connecticut
Mildred W. Graham Georgia State University Atlanta, GA 30303	Georgia
Walter A. Cory Coordinator for School Science Indiana University Memorial Hall W-108 Bloomington, IN 47405	Indiana
Frank Starr 1115 West 12th Cedar Falls, IA 50613	Iowa

James G. Macmillan
University of Northern Iowa
Cedar Falls, IA 50614
Iowa

Adela S. Elwell
Route 8, Box 479
Bemidji, MN 56601
Minnesota

Dudley F. Peeler, Jr.
Neurosurgery Laboratory
University Medical Center
2500 North State Street
Jackson, MS 39216
Mississippi

Lee N. Bolen
Acoustics Lab
University, MS 38677
Mississippi

Dean A. Rosebery
Division of Science
Northeast Missouri State University
Kirksville, MO 63501
Missouri

Claire Oswald
College of St. Mary
1901 South 72nd
Omaha, NE 68124
Nebraska

Lora M. Shields
Navajo Community College
Shiprock, NM 87420
New Mexico

Paul Sullivan
149 Sixth Avenue
Brooklyn, NY 11217
New York

Ross J. Baker
North Carolina School of Science
and Math
Durham, NC 27705
North Carolina

Gary K. Clambey
Department of Botany/Biology
North Dakota State University
Fargo, ND 58105
North Dakota

William C. Schmitt
c/o COSI
280 East Broad Street
Columbus, OH 43215
Ohio

Lynn E. Elfner
445 King Avenue
Columbus, OH 43201
Ohio

Charles M. Vaughn
Department of Zoology
128 Upham Hall
Miami University
Oxford, OH 45056
Ohio

George C. Shoffstall
West Penn Hospital
4800 Friendship Avenue
Pittsburgh, PA 15224
Pennsylvania

Sister M. Gabrielle Maze
Grove & McRoberts Road
Pittsburgh, PA 15234
Pennsylvania

Shyamal K. Majumdar
Department of Biology
Lafayette College
Easton, PA 18042
Pennsylvania

Richard J. Randon
111 Columbia
Oak Ridge, TN 37830
Tennessee

Dallas W. Cocke
The Collegiate Schools
North Mooreland Road
Richmond, VA 23229
Virginia

Ertle Thompson
308 Montebello Cl.
Charlottesville, VA 22903
Virginia

REPORT
to
The Board of Directors
of
The National Association of Academies of Science
by

The Committee on Appropriate Roles and Strategies for Science Academies in Relation to the AAAS Coalition for Education in the Sciences

Committee Members
Mr. Lynn Edward Elfner, Chairman
The Ohio Academy of Science

Dr. Robert W. Hanson
Iowa Academy of Science

Dr. Dudley F. Peeler, Jr.
Mississippi Academy of Science

Mr. LeRoy R. Lee
Wisconsin Academy of Sciences, Arts and Letters

Mr. Paul Sullivan
JETS, Inc.

Mr. Walter A. Cory, Jr.
Indiana Academy of Science

BACKGROUND

On May 13-14, 1982 over 50 organizations affiliated with AAAS were represented in Washington, D.C. at a meeting designed to establish a coalition of affiliated societies for science and mathematics education. Of the 50+ affiliates at the AAAS meeting, 10 were science academies. This meeting followed a national convocation on the subject by the National Academy of Sciences and the National Academy of Engineering. The report of the NAS/NAE is available from The Commission on Behavioral and Social Sciences and Education, National Academy of Sciences, 2101 Constitution Avenue, N.W., Washington, D.C. 20418.

On May 28, 1982 the Board of Directors of the National Association of Academies of Science meeting in Detroit appointed Lynn Elfner, Robert Hanson and Paul Sullivan to a committee for the purpose of defining the role and strategies of science academies in relation to the new AAAS Coalition on Science and Math Education. Also on that committee were Dudley Peeler, Walter Cory and LeRoy Lee.

On October 6, 1982 Lynn Elfner circulated a memo to the committee and to the NAAS Board. Based on that memo and on the comments from committee members we now submit the following recommended roles and strategies for science academies in relation to the AAAS Coalition for Education in the Sciences.

Throughout the NAS/NAE Convocation and the AAAS Coalition Meeting numerous references were made to the need for state and local action. While some national organizations (e.g., the National Society of Professional Engineers) have strong state offices, many discipline related groups (American Chemical Society) have local chapters and not strong state offices. In the case of trade groups, rather than purely discipline related academic groups, however, the states have very strong offices (e.g., American Medical Association, American Dental Association, American Pharmaceutical Association, National Wildlife Federation). Many of the more politically powerful trade groups who should have an interest in science and math education are not affiliated with AAAS (e.g., state chambers of commerce, manufacturing associations, education and petroleum groups, utilities, professional health groups, etc.).

Many national affiliates of AAAS do not have science and math education as their main focus; when they get concerned their interest is predictably directed at recruiting more for their kind (e.g., computer scientists, zoologists, chemists, etc.) rather than promoting general scientific literacy. The support and advancement of a science and technology based society in a democracy depends on producing new talent (5% of the workers) *and* producing a scientifically literate population (95%) as a whole.

Given this background,

- renewed national interest in the quality of science and math education;
- development of a national coalition of AAAS affiliates, many of which do not have state offices but which have local chapters;
- existence of some affiliates with strong state offices;
- existence of many non-AAAS affiliated trade groups who should be interested in science and math education; and defining the role and strategies of science academies
- existence of 40 + regional, state and local science academies and participation of 10 of these in founding the AAAS coalition, we suggest the following *roles* and *strategies* for science academies as members of the AAAS Coalition for Education in the Sciences.

1. *Provocative criticism*

Example: On more than one occasion at the two Washington meetings suggestions were made by speakers and discussants to set up awards for teachers. Science academies have several decades of experience with awards programs. One state now budgets more than $15,000 for its program.

Strategy: Science academies need to say to those who are proposing these awards that they are already being given. Other groups need to join forces with the Academies to upgrade the programs rather than to reinvent the wheel.

Example: Many national education study groups are composed of some highly qualified people. However, the perspectives of these national stature members may not be in line with those at the grassroots level—where the major responsibility for science and math education is.

Strategy: Science academies, individually, through the NAAS and through the Coalition, need to push for regional meetings of study groups to provide evaluation and provocative criticism of ideas so that final recommendations will have acceptance locally.

2. *Adaptation of existing programs*

Example: Science Service has developed both science fairs and the Westinghouse Science Talent Search. These programs serve thousands of students each year.

Strategy: Science academies should adapt national programs to meet the local needs. Many state science academies are already doing this.

Example: Based on a Canadian project, The Ohio Academy of Science produced *Ohio's Natural Heritage*. Following Ohio's effort, and tailoring it to fit their needs, the Iowa Academy of Science has produced *Iowa's Natural Heritage Book*—a project nearly twice the size of the Ohio effort. Other states are involved, too, in similar productions.

Strategy: Looking to other science academies and to national organizations there are many "off the shelf" programs which should be adapted at the state and local level

3. *Assessment of state and local conditions*

Example: When a certain national organization wanted to seek a large grant from a state based corporation they called on a science academy several times to get information on school statistics (number of teachers, students, buildings, etc.) and to ask whether the science academy had been successful in getting funds from this industry. Moreover, the academy suggested ways in which the project would be compatible with its efforts and ways in which the program would be more acceptable to the teachers in that state.

Strategy: National groups wishing to carry out state and local programs need to check with the resident experts who can provide an assessment of state and local conditions. Surveys of the state of science and math education should include the opinions and observations of science academies.

4. *Public relations and visibility for the problem*

Example: The leadership of many scientific and technical organizations is concerned not so much with education as with research. While this concern should not be thwarted, there is a need to focus and rally the scientific and technical community toward solutions to problems in science and mathematics education.

Strategy: Science academies should adopt the theme and make sure it has visibility throughout their membership and programs.

5. *Coordination at state and local level*

Example: Other than science academies there are few, *if any,* AAAS affiliates with state offices which have a primary interest in science and math education. Some claim could be made for the work of NSTA affiliates, but most are loosely knit and not necessarily staffed and funded. A number of science academies have full time offices and most science academies consider science and math education—especially of high school students—a major area of emphasis. Because science academies have members and support from more than one area or discipline they have fewer restraints to hold them back from working with a variety of other interested organizations.

Strategy: Science academies should be the focal point for coordination of private initiatives at the state and local level. They can marshall the diverse groups—not just AAAS affiliates—needed to solve the problems in science and math education. Statewide groups and local chapters of national groups (both AAAS affiliates and interested trade associations) should be asked to support the coordination role of science academies where they exist.

6. *Dissemination of information*

Example: All science academies have publication, many of which are of a newsletter variety. Academy publications go to thousands of people including AAAS members, Academy members, science teachers, school librarians, superintendents and R & D companies.

Strategy: Science academies should be counted on to share up-to-date information on the Coalition with their members and others. If each Academy will take on this responsibility more than 50,000 people could be reached. . . at the grassroots level.

Example: Many speeches were given at the National Convocation on Science and Math Education in May 1982. In one state a report of this conference was promptly produced and distributed to academy officers and others including corporate sponsors of programs and to the State Superintendent of Public Instruction.

Strategy: This kind of technical information, if packaged timely and attractively, can have influence on state and local opinion and policy makers. Science academies should aggressively and selectively disseminate information which becomes available from national meetings or from the Coalition.

SCIENCE AND CREATION

Geological, Theological, and Educational Perspectives
Edited by Robert W. Hanson

"Teachers of science are encountering increasingly serious problems because of the growing acceptability to the public of traditionalist positions on the discoveries and belief systems of science. Many fundamentalist groups view some basic scientific developments as unacceptable threats to their world view and attempt to counter such developments by mandating the introduction into science teaching of material neither based on nor verified by the processes of science. Evolution is currently the most prominent scientific development at issue, but it is certainly not the only one at risk. And while legislation in various states to require teaching creationism on an equal basis with evolution has generally not been supported in the courts, fundamentalist groups continue to press their ideas successfully on local school boards and state curriculum committees throughout the country.

This volume deals with the proposition that challenges to science are more than struggles between the forces of rationality and irrationality and that belief and value systems must be respected, even as the findings of science are taught without compromise. It attempts to make clear how evolution, and science as a whole, are viewed in the context of the public's concern about religious and moral values, and it offers help to classroom teachers who must deal with these problems in an increasingly politicized and hostile climate".

Table of Contents

1. Introduction: Science or Belief, A False Dichotomy
   Robert W. Hanson, University of Northern Iowa
2. The Age of the Earth, of Life, and of Mankind: Geology and Biblical Theology versus Creationism
   James W. Skehan, S. J., Boston College
3. Science, Rationality, and the Creation-Evolution Dispute
   Dorothy Nelkin, Cornell University
4. Science versus Revealed Truth: The Challenge of Creationism in the Classroom
   Wayne Moyer, National Association of Biology Teachers
5. Creationism in Iowa: Two Prototype Defense Strategies
   Stanley Weinberg, (textbook author), Iowa
6. Creationism in Kentucky: The Response of High School Biology Teachers
   William E. Ellis, Eastern Kentucky University
7. A Two-Model Creation versus Evolution Course
   William M. Thwaites, San Diego State University
8. Educational Approaches to Creationist Politics in Georgia
   Kenneth Saladin, Georgia College
9. Creation, Evolution, or Both? A Multiple Model Approach
   Craig E. Nelson, Indiana University

10. Skepticism: Another Alternative to Science or Belief
Stephen G. Brush, University of Maryland

11. The Creationism Issue: A Theologian's View
Langdon Gilkey, University of Chicago

Appendices

A. The Arkansas creation science statute (Act 590 of 1981)
B. "Creationism in Schools: The Decision in McLean versus the Arkansas Board of Education"

The NAAS Proceedings Editor's Note:

The above is a draft description of the book, "Science and Creation," edited by Dr. Robert W. Hanson, Past-President of the NAAS. According to Dr. Arthur Herschman, Head of Meetings and Publications, AAAS, the book is scheduled to be a volume in the new AAAS series of books on interdisciplinary and public policy topic to be published for AAAS by MacMillan Publishing Co., Inc. The book should be available in the early part of 1984.

ANNUAL BANQUET

National Association of Academies of Science and American Junior Academy of Science

May 27, 1983; 6:30 p.m.
Engineering Society of Detroit
Detroit, Michigan

PROGRAM

Reception	Founder's Room
Presiding	Frank W. Starr
Invocation	Ertle Thompson

DINNER

Introduction of Guests	Frank W. Starr
Recognition of AJAS Delegates	William C. Schmitt
Presentation of AJAS Award	William C. Schmitt
Distinguished Service Award	George C. Shoffstall
Introduction of Speaker	Dallas W. Cocke
Speaker	Frank W. Starr Science Coordinator Waterloo School System Waterloo, Iowa

"Alpine Country"

Adjournment

AJAS COMMITTEE

Director	William C. Schmitt
Assistant to the AJAS Director	Stephanie A. Martin
Banquet	Dallas W. Cocke
Local Tours	Robert Poel, Paul Sullivan
Oral Presentations	Sister Janet Christenson Sister Mary Alvernia Grosnek Michael Johnson
Reception	Rene Filipowski
Registration	Stephanie A. Martin
Poster Presentation	Arthur E. Hughes Elmer Bernath Sister M. Gabrielle Maze
Housing	James D. Edoff

COMMITTEE CHAIRPERSONS

AJAS	William C. Schmitt
Program	George C. Shoffstall
Nomination	Robert W. Hanson
Publication	Lynn E. Elfner
Recognition	George C. Shoffstall

AJAS DELEGATES

ARKANSAS	Todd Gordon
CALIFORNIA	Sampiere Carlisle
COLORADO	Mona McArdle
ILLINOIS	Rhonda McNulty
IOWA	Doug Grier, Jeff McKinney
LOUISIANA	Shelly Nicholas
MARYLAND	Nancy Freed
MICHIGAN	Vicki Badgett, L'Tonya Braceful, Lisa Ann Gibson, Lisa Green, Mary Anne Kania, Kris Manlove, Todd Mann, Marco Martinez, Mussadig Nazeeri, Marcell Nelson, Benigo Sifuentes, Karen Stevens, Roderick Walter, James Wilkes, Steven Wright
MISSISSIPPI	Kenneth Watford
MISSOURI	Yvette Barera, Janet Nelson
NEW JERSEY	Julie Krivy, Richard Vecchiolla
NEW MEXICO	Amy James
NEW YORK	David J. Weitz
NORTH CAROLINA	Murray Abramson
OHIO	Charles Linville, Diane Willford, Philip Winchell
OKLAHOMA	Cuong Viet Do, Margaret Gladstein, Kevin Ingram
PENNSYLVANIA	Maureen Henry, Kenneth Kim, Jack Tsao, Belinda Yim
SOUTH CAROLINA	Bret Hursey, Hien Thong
TEXAS	Joe Cerda, Helen Chew, Paul Hennington, Patricia Zoch
VIRGINIA	Rosemary Ashman, Douglas Morgan, Christopher Wiley

Listed above all AJAS delegates registered as of May 1, 1983

AMERICAN JUNIOR ACADEMY OF SCIENCE ABSTRACTS OF STUDENT PAPERS PRESENTED AT THE 149th NATIONAL MEETING OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE 26-31 MAY 1983, DETROIT, MICHIGAN*

ABSTRACTS**

A Diurnal Study of Chemical Compound Fluctuations in an Aquatic Environment. PAUL HENNINGTON (Texas Academy of Science)—In order to preserve an environment, one must first understand its normal state. Therefore, this research was done to establish a pattern concerning the diurnal fluctuations of chemical compounds in an aquatic environment, learn the physical and biological factors that influence the fluctuations and to apply these tests to the San Marcos River. The first step was to set up two aquaria, one having a day from 6:00 a.m. to 6:00 p.m., and the other from 12:00 a.m. to 12:00 p.m., simulating an aquatic environment. Tests established interacting patterns in the diurnal fluctuations of dissolved oxygen, carbon dioxide, chloride, pH, nitrates and nitrites. Next, the effect of light intensity and temperature on the fluctuations was investigated. Once the laboratory studies had been completed, the field study was initiated. It was conducted at sites of low and high plant life and low and high turbulence. The results from this twenty-four hour study indicated the patterns found in the laboratory tests existed in nature. Also, it was found that the environment of the San Marcos River, having a constant temperature of 21 degrees C, high transparency, turbulence and volume, and velocity of flow interacting with the chemical fluctuations, make it one of the most unique environments in the world.

Tradescantia as a Bioassay of Common Air Pollutants. BELINDA YIM (Upper Dulbin Senior High School)—*Tradescantia* are plants commonly known as spider-worts. They are characterized by blue flowers and prominent yellow stamens. They have been shown to be susceptible to mutations from radiation, but the object of this research was to see the plant's response to air pollutants. In phase I *Tradescantia* cuttings were exposed to National Ambient Air Quality Standard levels of CO and SO_2. Observations under a dissecting microscope revealed that mutations in the size, shape, and color of the stamen hair cells had developed. In phase II 1, 2-dibromoethane, a substance released in car exhaust, was the pollutant. The death of the plants led to some adjustments in calculations and the development of a new testing chamber. It was hoped that a correlation between pollutant concentration and mutation development would be found, but the results obtained were insufficient to lead to any conclusions in this area. However, *Tradescantia* was determined to be non-practical for use as air pollution detectors due to maintainence problems. Further research using the more common plant, the *Gladiolus,* is presently being conducted. If a correlation can be found, these plants may prove useful as inexpensive air pollution monitors.

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* Reprinted from AAAS *Abstracts of Papers* of the 149th National Meeting, 26-31 May 1983—Detroit, Michigan.

** The abstracts published herein have not been subjected to editorial scrutiny.

Prevention of Aflatoxin (A Carcinogen) and Other Mycotoxins (Yellow Rain) by Anti-Oxidants Ascorbic Acid, Tocopherols, Vitamin A, BHA, BHT, Tenox 20, Cinnamon, Sodium Selenite, Bioflavonoids, Superoxide Dismutase and Glutahione. MONA J. MCARDLE (University of Utah, Salt Lake City, Utah)—In recent years increased interest has been focused on the mycotoxins. Mycotoxins are secondary metabolites which are produced by certain types of fungi. Mycotoxins, such as the aflatoxins, have now been recognized as potential cancer-producing agents (carcinogens), and because they are found in man's food supply, they are important in the study of environmental carcinogenesis. Mycotoxins are not only a problem to the agricultural community, but they have also been implicated as biochemical warfare agents (Yellow Rain). My research is a progressive ongoing study using the anti-oxidants to prevent the formation of mycotoxins. The anti-oxidants ascorbic acid, tocopherols, vitamin A, BHA, BHT, Tenox 20, cinnamon, sodium selenite, superoxide dismutase, bioflavonoids and glutathione have been used to prevent and/or inhibit the growth of the mold *Aspergillus flavus* and thereby prevent the formation of its secondary metabolite, aflatoxin. Since these anti-oxidants have prevented the formation of aflatoxin, it is hypothesized that these anti-oxidants would also prevent the production of the biochemical warfare mycotoxins (Yellow Rain). Research in progress indicates that the anti-oxidants have an inhibitory effect on *Fusarium* fungi. In future research, anti-oxidants will be used to prevent chemical carcinogens.

Differences in Vertical and Horizontal Environments. CHRISTOPHER W. WILEY (E. C. Glass High School, Lynchburg, Va.).—There are environmental factors which affect and maintain vertical stratification of a given area as well as the environmental conditions parallel to the forest floor. Is the geological environment more influential in determining the type of ecosystem than the biological and physical influences? What differences can be found in studying the vertical and horizontal environments of three areas along Pigeon Creek that could show an influence on the characteristics of that area? To find this, examinations were made in the vertical and horizontal environments of the three ecosystems. The physical differences in the three communities are in the soil color, amount and type of vegetation, elevations, slope of terrain, light exposure, and in the community development. To study the vertical stratification, a number of environmental factors above ground were measured in each 100 square foot test site. The study of the horizontal stratification in each site involved an in-depth study of the soil and its relationship to the vegetation. In each site the texture, moisture content, and amount of organic matter in the soil were measured. It can be concluded that the soil formation is the most important factor in determining the type of ecosystem and the community's succession.

The Effect of Low Voltage Current on the Germination of Lima Bean (Phaseolus limensis) Seeds. ROSEMARY I. ASHMAN (Norfolk Academy, Norfolk, Va.).—This experiment demonstrates that lima beans (*Phaseolus limensis)* treated with an electric current during the early post-planting period germinate and grow at a faster rate than control plants. Lima bean seeds planted in potting soil were subjected to low voltage electric current for four days and compared to control plants in regard to speed of germination and subsequent growth. It was observed that the experimental group germinated faster and grew at a significantly greater rate than the controls, an effect which persisted throughout the period of observation, even after the cessation of electrical stimulation. This information may be useful in agriculture, providing a potential means of increasing the yield of seed crops, especially in climates where the growing season is abreviated and short germination times and accelerated early growth may be of critical importance.

The Effect of Ethrel on the Enzyme Activity Involved in the Abscission of the Leaves of the Coleus Blumei Plant. VICKI NANCY BADGETT (Renaissance High School, MI)—Abscission is the process whereby leaves become detached from a plant at the abscission zone located at the base of the petioles. Abscission is brought about by the destruction of the cell wall at this point, but it may be induced by manipulating enzyme activity involved in this process. To determine the effects of this form manipulation using the hormonal chemical, ethrel, the cellulase and peroxidase enzyme activity involved in the abscission process of the Coleus plant was observed. To observe this activity three leafless and intact Coleus plants were exposed to the chemical and one of each type was placed in an ultra-violet, dark, and light environment with corresponding control plants. After 48 hours the abscission zones were removed from the plants and ground into liquid extracts. To test for cellulase activity, 5ml of carboxymethylcellulose were added to .1ml of the Coleus extracts and to test for peroxidase activity 1.3 ml of hydrogen peroxide and 1.3 ml of guaicol were added .1ml of the extracts and activity was determined using a spectrophotometer. In all cases, cellulase and peroxidase activity increased in dark and ultra-violet environments respec.

A Study on Toxaphene's Effects on the Diatom Naviculla pelliculosa. HIEM THONG (Richland Northeast High School, Columbia University).—Toxaphene, a complex mixture of polychlorinated camphenes and bornanes, is presently the most widely used insecticide in the U.S. Toxaphene has been shown to be highly bioconcentratable and toxic in laboratory animals. However, not much research has been devoted to the study of toxaphene's effects upon phytoplankton organisms such as algae and diatoms. The purpose of this paper is to study the effects of toxaphene on the diatoms *Naviculla pelliculosa,* a common representative species. Toxaphene was shown to cause significant decreases in oxygen production by the diatoms. The bioconcentration of toxaphene by the diatoms was determined by gas chromatography (electron capture) and was shown to have a relatively high factor. Therefore, toxaphene, with its high toxicity and bioconcentration factor, does have the potential to threaten one of the ecosystem's most productive and important organisms, the diatoms.

Enrichment of Streptomyces Antibioticus DNA for the Phenoxazinone Synthase Gene. LISA D. GREEN (Renaissance High School, Michigan)—Streptomyces antiobioticus is an actinomycete which produces an enzyme, Phenoxazinone Synthase. PHS is found as a small form (S) and a large form (L), each composed of the same subunit. In young cells, there is a larger percent of S than L, however, as the cells age, there is a larger percent of L than S. Thus, L would be formed by the conversion of S over a course of the growth of the bacteria. The cells were grown on a galactose-glutamic acid medium. They were labeled with ^{3}H-leucine, samples were taken, and they were then chased with non-radioactive leucine. More samples were taken on 12 hour intervals. These samples were prepared and radio assayed for total protein. A PHS antibody was used to precipitate the PHS subunit, and it was prepared and radio assayed. The results, when graphically, compared, showed the PHS subunit as stable for a relatively long period of time thus suggesting that the S form is converted to the L form over the growth of the cell.

In Vitro Chemotherapy Sensitivity Assay on Cultured Cancer Cells. KIM, KENNETH S. (Cheltenham H.S., Wyncote, Pa.)—The purpose of this study was to determine whether in Vitro chemotherapy sensitivity could be tested in a short term cell suspension culture system. Human lymphocytic leukemic cells were suspended in culture medium and aliquoted into 6 ml. in tissue culture flasks. Various chemotherapeutic agents were added into each flask in duplicate and incubated for 2 hours at 37 C. The cell suspensions were then centrifuged to remove the drugs, resuspended in same medium and kept at 37 C. Daily cell counts were made from each flask along with dye exclusion test by using trypan blue. The results showed that methotrexate, vincristine, daunorubicin and cytosar were most effective in cell killing. Vinblastine and dactinomycin had intermediate strength. 5-flurouracil had almost no effect. When different concentrations of the drugs were used, the higher the concentration of the drug, the more cells were killed. When two drugs were combined, some showed significant increase in cell killing, whereas the others showed either minimum change or even antagonistic effect. To study pharmaco-biological property of the leukemic cells, folic acid or citrovorum factor was added after the cells were exposed to methotrexate. As expected, citrovorum factor protected the cell killing completely, whereas folic acid did not. These experimental results suggest that in Vitro chemotherapy sensitivity can be tested in a short term cell suspension culture system. However, these results should be correiated with in Vitro study to be useful for clinical application.

The Influence of Hyperbaric Pressure, Vacuum, and Mixed Gases on the Antimicrobial Activity of Piperacillin. PHILIP J. WINCHELL (Ohio Junior Academy of Science)--Piperacillin, a new semisynthetic antibiotic with a broad spectrum of antibacterial activity, was tested for drug efficacy under different combinations of nitrogen, oxygen, helium, and air with varying hyperbaric conditions. The greatest effectiveness was predicted for the 0_2 combinations. Two bacteria, *Escherichia coli* and *Micrococcus luteus* were grown in nutrient agar and the experimental dishes innoculated with piperacillin sensitivity discs. These, and control dishes without the antibiotic discs, were subjected to seven different mixed gases at four different pressures. A second group of dishes, also experimental and control, were grown under mixed gases, but at atmospheric pressure. The gas mixtures chosen were: air, 20% 0_2 - 80% He; 50% 0_2 - 50%

He; 80% O_2 -20% He; 20% N_2 - 80% He; 50% N_2 - 50% He; 20% N_2 - 80% He. The pressures selected were: 8, 30, 60, 120 psia. Equipment included a pressure chamber capable of exerting a pressure up to 150 psi; bell jar; gas control system; vacuum pump; and incubator. Results of 56 trials indicate that the data collected is extremely diverse. There were substantial differences in antibacterial action of piperacillin on *E. coli,* a gram-negative bacterium and *M. luteus,* a gram-positive bacterium, in that growth patterns were much more stable for *M. luteus.* Although results do not indicate strong positive or negative correlations to the hypothesis, they do suggest a general increase in drug action and has implications for baric medicine - both oceanographic and aerosp.

Development of a New Method of N-Nitrosamine Detection and Quantification using Electron Spin Resonance. DOUGLAS MORGAN (McLean High School, Falls Church, Va.)—Sudies of recent years have shown that carcinogenic N-nitroso compounds occur both naturally and artifically in our environment. This recognition has necessitated the development of new methods of detecting and quantifying such compounds. The Food and Drug Administration, responsible for analyzing food contents, began a project for development of a new technique utilizing electron spin resonance (ESR) to measure the amount of N-nitroso present in laboratory samples. To test the feasibility of using the new technique in the analysis of food and beverage samples, extraction and clean-up procedures were developed for malt beverages extracts. Spiked extracts and other samples were then tested through the use of ESR, and the results were compared to data obtained by the widely-used gas chromatograph-thermal energy analysis (GC/TEA) method. Various concentrations of nitrosodimethylamine (NDMA) were analyzed, and special emphasis was placed on how the ESR measurement was affected by either the extraction or clean-up steps. An efficient method was thus developed whereby ESR was seen to compare favorable to GC/TEA and several differences were noted.

Daphina magna Toxicity Testing. YVETTE MARIE BARERA (Cor Jesu Academy)—Current protocol recommended by ASTM for conducting 48-hour static acute toxicity tests indicates 24 hours to be the optimum age for *Daphnia magna* at the beginning of the test; however, literature research has indicated no past experimentation which support this requirement. Acute toxicity tests were performed with six age groups of Daphnia magna, ranging from 6 hours to 216 hours of age, with five chemicals selected on the basis of their physical and chemical properties as well as their acute toxicity to Daphnia. The age of the Daphnia did not significantly alter the 48-hour EC50 values for chemicals tested. The maximum difference observed in the 48-hour EC50 values between the 6-hour and 216-hour age groups was a factor of 3.9 for LAS. For purposes of standardization, it appears that *Daphnia* 48 hours of age at the beginning of the test can be used to conduct acute toxicity tests with most chemicals.

Physiological and Historical Alterations in Chick Embryos Induced by Diesel Exhaust Components. MARY A. KANIA (Michigan Junior Academy of Science)—As the use of diesel engines increases, there is a growing concern about the exhaust components that are emitted into the atmosphere. Among the particulate emissions is the polycyclic aromatic hydrocarbon group, many of which are known to be carcinogens and/or toxins. Ninety percent of these PAH are carried by particulates less than one micron in diameter; and therefore, are available through ingestion, inhalation, or skin contact. Various concentrations of six such PAH: anthrone, benzo(a)pyrene, fluorene, napthalene, pyrene, Z-napthol, as well as actual diesel exhaust and particulates, were tested through direct and indirect chemical exposure, on the vertebrate chick embryo. For direct chemical exposure, the chemical amount was less that .01% of the total egg mass. Approximately one-third more chemical was used for indirect chemical exposure. For the 444 eggs examined, the chemical or exhaust exposure resulted in abnormal histological mutations determined by the vital organ sections, heart and muscle tissue macerations, blood chromatography, and feather samples. Physiological mutations, as determined by: 8 linear body measurements, vital organ masses, embryo mass, stage of development, and observation, were noted. Severity of physiological mutations were also related to the deviations in linear body measurements.

The Influence of Hormonal Changes During the Estrous Cycle on Rat Skin Flap Survival. JULIE BETH KRIVY (Cherry Hill High School East)—It has been thought that perhaps the hormones of the estrous cycle would have an effect on flap survival, therefore, male rats have almost always been used in experimentation involving skin flaps. A recent study has shown sex differences in control skin flap survival, as well as in response to vasodilators. This study was designed to investigate one of the reasons for sex differences in flap survival; intra-female variability possibly associated with hormonal changes during the estrous cycle. Twenty-nine mature, female Long Evans rats were used. They were divided into two groups; the estrus and anestrus stages of the estrous cycle. A McFarlane-type skin flap based cephalad upon the rat's dorsum, was outlined, raised, then fastened back onto its bed. After a week, the flap was examined, measurements were taken and the % flap survival was arrived at. There was no significant difference in flap survival between rats in the estrus and anestrus stages. These differences, therefore, can be attributed to the sex hormones estrogen and testosterone and not to intra-female variability of estrogen. It was concluded that the hormonal changes during the estrous cycle have no significant effect on skin flap survival.

Philosophy of a Tri-axial Planar Coordinate System. CRAIG JORDAN (Putnam City North H.S.)—Since the time of Euclid the dimensions of space have been intuitively associated with perpendicular lines. Thus the "angle of dimension" has always, if only intuitively, been 90°. I propose to change this by introducing an acute angle of dimension —specifically a 60° angle. However, generalizing the concept of dimension to angles other than 90° will yield fruitful results in areas other than coordinate geometry where it originated. A general principle—that the angle of dimension and its supplement are equivalent in many general areas—arises from this research. Such a principle is used without being recognized when the areas of polygons are found using trigonometric formulas involving sin. But the principle can also be applied, without inconsistency, to many general branches of mathematical computation and more abstractly to branches of theoretical mathematics. A 60-120 trigonometry has already been developed as a result of this principle. In conclusion, I must say that such alterations to our intuitive ideas about dimensions are hard to accept; thus, I am only beginning to recognize their consequences. However, those consequences, when fully developed, will constitute a powerful generalization in the brance of mathematics dealing with dimensions.

Controlling Circadian Rhythms in Mice and Men. RHONDA J. MC NULTY (Illinois Junior Academy of Science)—PURPOSE: To determine a) methods for plotting and altering circadian rhythms and if sex, age, or alterations of the day-night zeitgebers are factors b) the easiest ways to change shifts or travel time zones c) factors that control circadian rhythms and d) the effects of irregular eating. PROCEDURE: Seven experiments with test and control groups of mice were performed. Temperature and light cycles were controlled. Physical activity tests and mice asleep counts were taken every six hours over a period of six to thirteen days depending on the experiment. CONCLUSIONS: Circadian rhythms can be recorded with periodic running wheel counts, mice asleep counts, and temperature recordings. Rhythms seem to be affected by variations in the external temperature, light-dark cycle, but not by the age and sex of mice. Rotating shifts and travel cause disruptions in the rhythms. For humans, the least disruptive method for changing shifts with unchanging zeitgebers is a gradual shift. The least disruptive method for adopting to a change in a zeitgeber is either to keep the old shift or to instantly adopt the new one. Disruption of one rhythm, such as an activity cycle can easily disrupt another such as an activity cycle. Social contact will tend to cause synchronization of two different animal's rhythms. Regulating one's lifestyle and methods with conditioned response and biofeedback can, in a limited way, control the rhythms. Rhythm research may help solve problems of shift workers, jet lag, timing of operations, and depression.

Synthesis, Extraction, Characterization and Allelopathic Effects of Juglone (5-hydroxy-1, 4-naphtoquinone). JANET E. NELSON (Central High 26th and Edmond St. Joseph)—Juglone (5-hydroxy-1, 4-naphthoquinone) is produced by the air oxidation of the hydroquinone in black walnut hulls. It is toxic to plants; animals, including fish, rats, mice, and frogs; and also to yeast, fungi and bacteria. This research included the synthesis of juglone by dichromate oxidation of 1,5-dihydroxynaphtalene. The second phase of research was the extraction of juglone from walnuts via soxhlet extraction. The synthesized and commercially obtained juglone were compared via IR and NMR spectroscophy. The final phase of the research involved tests with juglone on Aspergillus as a mold inhibitor.

Hemodynamic Differences in the In Vivo Arterial Systems of SHR and WKY Rats. JAMES E. WILKS (Renaissance High School, Detroit, Michigan)—The purpose of this investigation was to contrast the differences in the biophysical properties of the in vivo arterial system in hypertensive and normotensive rats. Studies were performed on 9 hypertensive (SHR) and 7 normotensive (WKY) to test the hypothesis that SHR rats have a lower arterial compliance (C) than WKY rats. All rats were anesthetized with 10% urethane intraperitoneally and underwent a midline thoracotomy with placement of an electromagnetic flow probe and a catheter-tip monometer in the aorta. Steady-state pressure (Pm) and flow (Fm) were used to calculate total peripheral resistance (Rp). Prolonged diastoles were produced by an EKG timed aortic occluder. The decay time constant (T) for each prolonged diastole was calculated by an exponential fit of the initial linear segment of the log (pressure). Arterial compliance was calculated from the relationship C = T/Rp. The results (mean ± SD) are summarized in the following table:

	Pm (mmHg)	Fm (ml/sec)	T (sec)	Rp *(mmHg x ml/sec)* (sec)	C x 10^{-3} (ml/mmHg)
SHR	104	.477	.180	227	.878
	± 16	± .082	± .050	± 62	± .335
WKY	82	.414	.216	205	1.10
	± 16	± .114	± .072	± 47	± .314

Thus, the defect appears to be throughout the arterial system of the SHR.

Algorithmic Analysis of Divisibility Between Integers. MARK YU DA WANG (Normal High School, Norman, Oklahoma). (Oklahoma Junior Academy of Science)—The well known division algorithm has been the standard method for testing divisibility; from it, a number can be broken down into its prime power decomposition. Combinations of these prime factors are the possible divisors. There are "tricks," however, for divisors 2, 3, and 5 that aid in determining divisibility. Besides these few cases, divisibility, particularly between large integers, remains a tedious process. My project addresses that problem. Using number theoretic techniques, I was able to get an understanding of these "tricks" which led to generalizations and insight as to the formation of new algorithms. My research presents divisibility tests for divisors of the form 2^n, 5^n, divisors of $10^n - 1$, $10^n \pm 1$, and divisors whose units digits are 1, 3, 7, and 9 (divisors which are relatively prime with 10). Two of my results that involve "unit multipliers" are the following: Given that $a = (10)m \pm 1$ and $b = (10)k + n$. a divides b if and only if a divides $k \mp mn$. Given that $a = (10)m \pm 3$ and $b = (10)k + n$. a divides b if and only if a divides $k \pm (3m \pm 1)n$. The realization that the testing for divisibility was not equivalent to factoring a number in order to determine its divisors led swiftly and directly to new channels of progress.

Studies on the Inactivation of Gamma-Glutamyltranspeptidase by Alloxan. KEVIN INGRAM (Oklahoma Medical Research Foundation)—Rat kidney gamma-glutamyltranspeptidase (GGTP) was found to be totally and irreversibly inactivated with respect to its hydrolase and transpeptidase activities by alloxan. The inactivation occured in two distinct phases and was found to be concentration, time, and pH dependent. The first phase was a slow reaction, possibly reversible in nature. The second phase was faster than the first and resulted in irreversible inactivation of the enzyme. The inactivation by alloxan was prevented when serine-borate, a competitive inhibitor of the enzyme, was allowed to bind with the enzyme prior to the addition of alloxan into the incubation mixture. This suggests an active site bonding nature by alloxan. Maleate, which had previously been reported to enhance the inactivation by DON and PMSF, actually provided moderate protection from inactivation by alloxan. This points out that alloxan significantly differs from other known inactivators of the enzyme. Since little is known about the mechanism of action of the enzyme, the introduction of this novel inactivator of GGTP should provide further insight into the chemical nature of the enzyme active site.

A Preliminary Study on mammelian lens epithelia cells cultured in medium KEI-4. LITONYA BRACEFUL. (Oakland University, Rochester, Michigan).—The long term goal of these experiments is to understand the mechanism controlling cell division, differentation and aging in mammalian epithelia cells. The lens consists of a pure population of epithelial cells. Experiments were designed to optimize the conditions required for the growth of lens epithelial in tissue culture in, KEI-4, a medium that mimics the composition of rabbit aqueous humor, medium that mimics the composition of rabbit aqueous humor. Rabbit lens epithelia cells were cultured in medium KEI-4 containing 1% heat-inactivated rabbit serum (HIRS), this served as the control. This medium supplemented with epidermal growth factor (EGF), fibroblast growth factor (FGF), or endothelial cell growth supplement (ECGS) were the variables being tested. EGF and FGF were present at 10-8 through 10-11 and EGGS was present at 25 through 100 mg/ml. Fifty-thousand cells were added to culture dishes containing the described medium. The total cell number was determined at day 7 of each experiment. Cells plated in KEI-4 plus 1% HIRS showed no increase. EGF and FGF at 10-8M and ECGS at 100μg/ml exhibited an increase in cell number. These results give data for additional studies aimed at defining the conditions required for the growth of mammalian epithelial cells in a defined-serum free medium. Ultimately these studies will be extended to experimenting with human epithelial cells cultured in a defined-serum free medium.

The Effects of Bendectin on Developing Organisms. MAUREEN HENRY (Serra Catholic High School).—This research was designed to study what effects the morning sickness drug Bendectin when applied in varying concentrations would have on developing organisms. Phase one studied Bendectin and the non-prescription drug Dramamine and their effects on Daphnia. These studies showed accelerated and sustained pulse and heart irregularities. Phase two using the same drugs was conducted on developing frog eggs. Definite aberrations were evidenced beginning in the 96 hour stage of development. Some abnormalities were sustained throughout the developmental process while other abnormalities proved to be a temporary retardation in the developing process.

Do "B" Vitamins Aid Amylase in Starch Digestion? SHELLY NICHOLAS (Leesville High School, Leesville, LA)—The purpose of the experiment was to determine if certain "B" vitamins, thiamine, riboflavin, or pantothetic acid, could act as precursors or coenzymes to the enzyme amylase, which is found in saliva and used in the digestion of starch.

An experiment was conducted using various concentrations of saliva and distilled water equaling 3 mL. Then, 3 mL of starch solution was added to each concentration. The test tubes containing these mixtures were placed in a water bath which was maintained at normal human body temperature, 37 °C. They were removed from the water bath in exactly 30 minutes when 2 drops of I_2 - KI, a starch complexing agent, were added to defect the amount of starch digestion, based on the color rx from clear to dark blue. The 20% saliva solution was determined as the minimum amount of saliva needed for achromic starch digestion. This experiment was repeated 3 times including a 0.5 mL of 10% solution of thiamine, riboflavin, and panthotetic acid in separate tests. Thiamine was the only vitamin that showed coenzymatic activity. The percentage of saliva solution needed for achromic starch digestion with thiamine was reduced to 13.3%, lowering the percentatge by approximately 6.7%.

Alpha$_2$-adrenoreceptor binding on various parts of rat brain cells treated chronically with cocaine. BENIGNO SIFUENTES-JAUREGUI (Cass Technical High School). The molecular mechanisms of cocaine addiction on the α_2-adrenoreceptors of the limbic system of the brain were studied by selective daily dosages of cocaine on male Sprague-Dawley rats. The neural receptors located within the brain are thought to be regulated by the amount of neurotransmitter substance and the duration that this substance is present in the vicinity of the receptor. Many drugs which are used to treat depression decrease the number of α_2-adrenoreceptors of the rat brain. Some drugs inhibit the uptake of norepinephrine to noradrenergic neurons. Cocaine, a psychomotor stimulant, inhibits norepinephrine uptake but is devoid of antidepressant activity. Inhibition and uptake result in an accumulation of norepinephrine at noradrenergic nerve terminals which can decrease the number of α_2-adrenoreceptors located on these nerve endings. The purpose of this study was to determine whether cocaine causes a change in presynaptic adrenoreceptors similar to the antidepressant drugs. The study shows that cocaine does decrease the number of α_2-adrenoreceptors on specific areas of the rat brain and supports the concept that the accumulation of norepinephrine at noradrenergic nerve terminals results in the decrease in the number of adrenoreceptors.

The Effect of Ribonucleic Acid on the Learning Ability of Lumbricus Terrestris. DIANE L. WILLFORD (Ohio Academy of Science).—The main purpose of this project was to see if RNA was involved in the storage of memories. This experiment was performed to determine if worms, injected with RNA from a trained worm to an untrained worm, would be able to master the T-maze with a fewer number of trials than the worm that had no injection of RNA. Therefore, the rate at which the worm could learn was of main interest. In this experiment, *Lumbricus Terrestris* were used to demonstrate that classical and operant conditioning can be learned by organisms with complex nervous systems. Each worm was placed into the T-maze five times a day until seven consecutive positive trials were completed by the worm. Twelve worms were trained in the T-maze for the extraction of RNA. After the extraction process was done, the RNA was used in injecting the next set of worms. The results of this experiment seem to indicate that the worms into which RNA was injected, learned faster than those worms that did not have RNA injected into them.

A Computer model of Population growth Using the Theory of Markov Processes. WALTER SCOTT (Charlettesville High School).—The theory of Markov processes is an important branch of probability which can be used in a variety of "real-world" applications. In a Markovian model, the state of a system at a future time t depends only upon the current state of the system and the probabilities of change, or in the discrete case, the outcome of a trial does not depend upon the outcome of any preceding trials. My paper shows how a biological system based upon Markov processes can be simulated on a microcomputer programmed in BASIC. The program that I developed was written on a Radio Shack Model III TRS-80, and uses formulas taken from Markovian theory to simulate and produce statistical information on population size in a simple birth-and-death system.

Computer Simulation of John Conway's Game of Life. JACK TSAO (Penn Hill Senior High School).—The purpose of this experiment was to write a user-interaction computer program in BASIC which would play John Conway's Game of Life. This game was described in the "Mathematical Games" section of the October 1970 issue of *Scientific American* and is played on a two-dimensional grid of cells. At the beginnning of the game some of the cells are occupied by living creatures and some are not. This initial pattern represents generation zero of a colony of creatures and each new generation is formed from the previous one evaluated by three rules: a living creature survives if it has two or three living neighbors; a living creature dies if it has less than two or more than three living neighbors; a creature is born if an empty cell has exactly three living neighbors. Each and every cell in the grid is evaluated by these rules each generation. The computer simulates the simultaneous checking of each cell, but changes to a given cell for the following generation do not affect the evaluation of the other cells. The program also prints the generation number and the population. The student solved the problem by first identifying his desired solution to the problem and then drawing a flowchart and writing the program. The result of this experiment was a working computer program. It demonstrates the feasibility of calculating the resulting population of a colony of creatures after a given number of generations. The program also allows the user to catalog many patterns of the colony in a relatively short period of time and provides entertainment.

An Input Format For Describing Integrated Circuits. MARCO AURELIO MARTINEZ (Cass Technical High School).—The purpose of this research effort is to develop a general input format for describing integrated circuit devices for subsequent computer simulation. The present capability of device simulation programs requires a user to develop (cumbersome) input subroutines to describe the geometry, impurity-coping profiles, and the mathematics for boundary conditions. Therefore, the present technology requires a special "custom" user input for each device. This takes time, time that could be used to further enhance integrated circuit technology, and thus, a major benefit of this project is to save time and engineering effort. The fortran computer language is employed in creating the input format and the major steps taken are to define the geometric processes of Integrated Circuits and assign a node connection arrangement.

Radiation Induced Soft Upsets in Microelectronic Devices. CHARLES LINVILLE (Ohio Junior Academy of Science).—As digital integrated circuits have become extremely dense, they have become sensitive to a new soft-fault mechanism; namely, the upset of data by the passage of ionizing radiation through the active area of the devices. This mechanism is demonstrated experimentally in dynamic random access memories and sixteen-bit microprocessors. Additionally, the specific device regions and elements that are subject to the soft-faults are shown, as is the dependence of the soft error rate on many other factors, including operation speed.

The Synthesis of a Cobalt Compound for Use in HPLC. KRIS MANLOVE (Renaissance High School, MI).—High Performance Liquid Chromatography is a method of separating substances by a differential rate of migration through a column packed with a retardant. The objective of this research was to devise a more perfect column packing that will separate compounds more efficiently and readily at a low cost. The cobalt compound ($Co\,Cl_2 \cdot 6H_2O$) was synthesized and attempts were made to displace the two water molecules on the new product $(CoEN_4) \cdot 2H_2O$ Co_3ClO_4 with hexylamine and ethanolamine. These amines contain R-groups that will provide better separation. However, due to an error in the addition of the hexylamine and failure of a pH change in the ethanolamine reaction, a titration process was necessary with the use of organic solvents such as diethylether, chloroform, acetone, ethanol, and tetrahydrofuran. However, rotary evaporation produced fairly good cobalt compound in the hexylamine reaction; there were indications of recrystalization with potassium chromoxalate trihydrate in the ethanolamine reaction. Thus, organic solvents were not suitable for recrystalization.

Optimization of a Group V Hydride Chemiluminescent Detector. MUSADDIQ NADEEM NAZEERI (Cass Technical High School), DONALD H. STEDMAN (University of Michigan), MARK E. FRASER (University of Michigan).—Chemiluminescence is intrinsically a very sensitive technique for the measurement of trace gases. The major requirement is that there be a fast exothermic reaction which results in light emission. Analyzing AsH_3 by chemiluminescence with ozone, we have demonstrated intense light emission at concentrations of a few ppm; but at lower concentrations, there is a non-linear decrease in intensity. We attribute this to a slow initial reaction of OH radicals with AsH_3 as the initiation step. The optimum operating conditions discovered use a reactor pressure of 310 Torr, and the radicals are produced by passing O_2 through 30% hydrogen peroxide and then through a low pressure ozonicr discharge. This condition results in linear detection of AsH_3 down to concentraitons as low as 200 parts per trillion.

The Percentages of Lead in Soil from Heavily Traveled Areas. JOE VINCENT CERDA (Texas Academy of Science).—The percentage of lead in soils of designated heavily traveled areas, over a yearly analysis, is examined. The first major task of this experiment was the acquiring of soil samples. The samples were collected monthly, each on the same day. Once collected, these soil samples were screened of any rocks, grass, and other extraneous items. The following step was to test the samples to indicate the percentage of lead particulates in the soil, using Ethelendiamedetra-acetic acid, titrated with Erichrome Black T Indicator. The perecentatge of lead was determined to be significant. The greater the vehicular traffic over a year, the greater the percentage of lead.

Solar Cooling: The Lithium Chloride Absorption System. KENNETH E. WATFORD (Bayou Academy).—The purpose of this project is to design, build, and test a solar cooling system. I did this by building a generator that will withstand high temperatures and high pressures. I connected this to a water-coiled condenser through a series of copper tubing and valves. This joins an evaporator, which consists of a tiny spray nozzle and coils of larger tubing. This final section of the system is the absorber, which connects the evaporator and the generator. The system works by evaporating the water from a solution of lithium chloride in the generator. When the pressure and temperature reach the desired level, the water vapor is released into the condenser. The vapor condenses into pure water leaving a strong solution of lithium chloride in the generator. The water, which is still under pressure, is forced into the evaporator where it vaporizes. This is where the cooling effect is obtained. The water vapor then moves into the absorber, where the strong lithium chloride solution from the generator is sprayed over it. The lithium chloride absorbs the water vapor because of its strong affinity to water, thus recreating the original solution, which is pumped back into the generator. The final phase of my project, testing various chemicals for effectiveness, proved that the lithium family performed well with lithium chloride giving the best results. I've concluded that solar cooling is a definite alternative to the rising costs of conventional cooling systems. As more research such as I have done in the last three years is conducted, solar cooling systems could see significant development and growth.

Meteoritic Impact Energy. BRET E. HURSEY (Clemson University).—The object of this research was to find consistent changes in crater forms due to varying meteoritic energies and to find the ratios of different impact energies to the total energy. The results suggested a method to determine the meteoritic energy which made a crater many years ago. A 30 foot tall tripod was built with a trap door device to release heavy spheres from different heights into sand. No matter what the mass of the sphere, the crater dimensions changed at a rate proprotional to the increase in energy. Slow motion photography was used to determine the mechanics of an impact. The impact energies measured (sound, heat, and mechanical movement of sand) represented 2.8% of the total impact energy. The significant conclusion of this research was the determination of the total meteoritic energy by measuring the crater. Regardless of the masses or drop height, mechanical energy represented 0.275% of the total energy. A constant of 364 was found and used to multiply the mechanical energy to determine meteoritic impact enregy. Mathematical integration was used to obtain the meteoritic energy, by knowing the height, thickness,and radius of the crater rim. This infers that by telescopically measuring craters on other planets or moons, the metoritic energy that formed a crater many years ago can be calculated.

Finding the Nth Prime. J. M. BOYTE JR. (St. Andrews Presbyterian College, Laurinburg, NC)—Take the set of all positive real numbers and arrange them in the fashion shown in figure one. If we look at the set in this manner the first row contains two primes, and each row above it contains the possibility of only one prime number. This possibility is the odd number which is the first or second digit in that row. If every row had one prime, except for the first row with two primes, then the formula for the N*th* Prime would be (figure two)

10	11	12
7	8	9
4	5	6
1	2	3

(figure one)

$$N\textit{th}\text{ prime} = (3n-3)_{\substack{-1 \text{ if } (3n\ -\ 3) \text{ is even} \\ -2 \text{ if } (3n\ -\ 3) \text{ is odd}}}$$

(figure two)

However, some rows contain no primes. To overcome this let us throw an "X" into our equation. The "X" represents the number (figure one) of rows below the N*th* Prime that contain no prime numbers. To solve for "X" we must know ⅓ of the primes up to the N*th* prime we are looking for. By knowing this we can find "X", making the formula for the N*th* prime. . .

$$N\textit{th}\text{ prime} = [(3n-3)+X]_{\substack{-1 \text{ if } (3n\ -\ 3) \text{ is even} \\ -2 \text{ if } (3n\ -\ 3) \text{ is odd}}}$$

Explaining how to derive "X" would take more space than I have here. I would be glad to explain any questions to anyone that cares to write.

A Methylene Blue Reductase Indicator for Escherichia Coli Infant Formula Contamination. JEFF MC KINNEY (Iowa Academy of Science).—I am modifying the American Public Health Association's Reductase test into a tropical field test indicating *Escherichia Coli* contamination in prepared infant formula. As an exchange student in Kuantan, Malaysia, I demonstrated the bacterial contamination of powdered infant formula prepared in Malaysian conditions. The A.P.H.A. test identifies *Streptococcus Lactis* in raw dairy milk at 35°C. I adapted the test to identify *Escherichia Coli* in prepared infant formula at Malaysian field temperatures (27 C.). If *Escherichia Coli* is present, it reduces Blue Methylene Blue to colorless Leuco Methylene Blue. Comparative reductase tests and standard plate counts results show my adaptations do not impare the test's accuracy. The simplicity, low cost and speed of my adapted reductase test could be useful to field workers, clinics and mothers working in Malaysian conditions.

The Enhancement of Glycine Max Through the use of Controlled Levels of Electro-Magnetic Radiation. DOUGLAS GRIER (Iowa Academy of Science).—Research was conducted to investigate and determine an optimum microwave exposure time that would produce significant enhancement of soybean development. The first test was a wet towel germination test to establish if exposing soybeans to microwaves would produce any beneficial effects. The next test was an emergence test conducted under laboratory conditions. The third test was actual field growth. Test four was conducted to determine the feasibility of large samples of soybeans. In test five, a Varian model PPS 2.5A microwave unit was utilized with a commercial size exposure sample. There were 24 test groups and 3 controls. The results of the 1st test showed that germination was increased 20% with limited exposure to microwaves. The results of the 2nd test established that limited exposure can produce emergence rates significantly higher than a control group. The third test confirmed the emergence results and demonstrated a statistically significantly increased yield. Test four results were inconclusive. Test five demonstrated that a microwave enhancement process is commercially feasible. A series of electron microscopy studies was conducted in order to determine why microwaves enhance the development. The studies demonstrated that microwaves produce fractures in the seed coats and with limited exposure, the embryo of the seed is undamaged. The fractured seed coat allows water to directly nourish the embryo, thus accelerating the germination and emergence process.

DIRECTORY OF MEMBER ACADEMIES AND THEIR ACTIVITIES
1983 - 1984

ALABAMA ACADEMY OF SCIENCE

OFFICERS: March 1983 through March 1984

President: Dr. Ray Isbell, University of North Alabama, Florence, Al. 35630.

President-elect: Dr. John F. Pritchett, Dept. Zoology-Entomology, Auburn University, Al. 36849.

Secretary: Dr. Mike Lisano, Auburn University, Al. 36849.

Treasurer: Dr. James Bradley, Dept. of Zoology-Entomology, Auburn University, Al. 36849.

Counselor Junior Academy: Dr. Eugene Omasta, Dept. of Biology, Troy State University, Troy, Al. 36801.

Coordinator of Science Fairs: Mrs. Elsie Spencer, (Opp High School), 301 East Jeffcoat Avenue, Opp, Al. 36467.

Editor Journal: Dr. William H. Mason, Chairman, Dept. of General Biology, Auburn University, Al. 36849.

Editor Newsletter: Dr. Roger Lane, University of South Alabama, College of Medicine, Mobile, Al. 36688.

Delegate of N.A.A.S.: H.A. Henderson, ARDA, TVA, Muscle Shoals, Al. 35660.

ACTIVITIES

Membership:

Sections: Biological Sciences; Chemistry; Geology; Forest, et al; Physics and Mathematics; Industry and Economics; Science Education; Social Sciences; Health Sciences; Engineering and Computer Science; Anthropology.

School Students: Junior academy (70 High Schools); Science Fair (7 regional Science Fairs); recognition of outstanding students; JSHS paper competition; research awards; annual scholarships ($500).

School Teachers: Recognition of outstanding teachers.

College Students: Research grants and awards for outstanding work, travel grants.

Gardner Award: Recongnition of an Outstanding Contribution to Science in Alabama.

Meetings: Annual Meeting (April): Papers, Poster Sessions, Symposia, Seminars.

Publications: Journal (quarterly). Newsletter, biannually.

Year of Founding: 1924

Dues for Regular Members: $15.00

ARIZONA-NEVADA ACADEMY OF SCIENCE

Please Note: Central Office Address—Math Mail Room, Arizona State University, Tempe, AZ 85287

President: Stanley S. Beus, Dept. of Geology, Northern Arizona University, Flagstaff, AZ 86001 Phone: (602)523-4561

President-Elect: Lay J. Gibson, Dept. of Geography & Regional Development, The University of Arizona, Tucson, AZ 85721

Corresponding Secretary: Neil Berman, College of Engineering, ASU, Tempe, AZ 85287

Treasurer: Ray Henkel, Dept. of Geography, ASU, Tempe, AZ 85287

Director, Junior Academy: Richard Forshier, Shadow Mountain High School, 2902 E. Shea Blvd., Phoenix, AZ 85028

Editor, Journal: Janice E. Bowers, Office of Arid Lands Studies, University of Arizona, 845 N. Park Ave., Tucson, AZ 85719

Delegate to N.A.A.S.: Troy L. Pewe

Membership Secretary: Carleton B. Moore, Center of Meteorite Studies, Dept. of Chemistry, ASU, Tempe, AZ 85287

Membership: 419

Sections: Anthropology, Biology, Conservation, Genetics, Geography, Geology, Hydrology, Physics, Science Education, Zoology, General

School Students: Junior Academy; Science Consultant Program and Visiting Scientist Program: four annual scholarships ($100 each); recognition of outstanding students; research grants

Meetings: Annual Meeting (April); research grants, scholarships

Publications: Journal of the Arizona-Nevada Academy of Science (4 times a year); Newsletter

Year of Founding: 1956

Dues for regular members: 1983-$15.00

ARKANSAS ACADEMY OF SCIENCE

OFFICERS: April 1983 to April 1984

Please Note: Central Office Address—Arkansas Academy of Science, Box 837, State University AR 72467

Executive Officer: Dr. David Chittenden, Secretary, Box 837, Arkansas State University, State University AR 72467 Phone: (501) 972-3086

President: Dr. Paul Sharrah, Department of Physics, University of Arkansas, Fayetteville AR 72701

President-Elect: Dr. William Evans, Department of Zoology, University of Arkansas, Fayetteville AR 72701

Vice President: Dr. Gary Heidt, Department of Biology, University of Arkansas at Little Rock, Little Rock AR 72204

Secretary: Dr. David Chittenden, same as above

Treasurer: Dr. Arthur Johnson, Department of Biology, Hendrix College, Conway AR 72032

Director, Junior Academay: Mrs. Marie K. Arthur, Rt. 5, Box 4ll, Malvern AR 72104

Editor, Proceedings: Dr. V. Rick McDaniel, Department of Biological Sciences, Arkansas State University, State University AR 72467

Delegate to N.A.A.S.: Dr. James Fribourgh, University of Arkansas at Little Rock, Little Rock Ar 72204

ACTIVITIES

Membership: 250

Sections: Anthropology-Sociology; Aquatic Enviroment: Biology; Biomedical Science; Chemistry; Geography; Geology; Physics; Psychology; Science Education.

School Students: Junior Academy; Science Fairs; Science Talent Search; Junior Science and Humanities Symposium

College Students: Awards for best papers presented by undergraduates at the annual meeting.

Members: Business meeting (April)

Publications: Proceedings of the Arkansas Academy of Science; Newsletter.

Year of Founding: 1917

Dues for members: undergraduate—$5.00; regular—$10.00; sustaining—$15.00; sponsoring—$25.00; life—$200.00; institutional—$50.00.

THE CHICAGO ACADEMY OF SCIENCES

OFFICERS: September 1982 to September 1983

Please Note: Central Office Address—2001 North Clark Steet, Chicago, IL 60614

•Executive Officer: Dr. P. G. Heltne, Director, 2001 North Clark Street, Chicago, IL 60614

President: Mr. George M. Covington, 2001 North Clark Street, Chicago, IL 60614

Vice President: Mrs. Nancy Gidwitz Gleason, 2001 North Clark Street, Chicago, IL 60614

Secretary: Penny J. Korhumel, 2001 North Clark Street, Chicago, IL 60614

Asst. Treasurer: Mr. Arthur Rasmussen, 2001 North Clark Street, Chicago, IL 60614

Editor, *Bulletin, Natural History Miscellanea:* Dr. P. G. Heltne 2001 North Clark Street, Chicago, IL 60614

Editor, Newsletter: Dr. P. G. Heltne, 2001 North Clark Street, Chicago, IL 60614

Delegate to N.A.A.S.: Dr. Leslie G. Freeman, 5537 South Woodlawn Avenue, Chicago, IL 60637

ACTIVITIES

Membership: 1300

School Students: Recognition of outstanding students; research grants; summer training programs; field trips.

School Teachers: In-service training; field trips.

General Public: Museum; seminars; lectures.

Members: Field trips; recognition of outstanding members, meetings (annual meeting in September).

Publications: *Science Notes; Bulletin; Natural History Miscellanea Museum Activities.*

*Continuous appointment

Year of Founding: 1857

Dues for regular members: 1982—$15.00

COLORADO WYOMING ACADEMY OF SCIENCE*

OFFICERS: April 1982 through April 1983

President: Dexter W. Hess, Dean of Faculty, Otero Junior College, La Juna, CO 81050.

President Elect: William K. Smith, Department of Botany, University of Wyoming, Laramie, WY 82071.

Vice President: Dennis H. Knight, Department of Botany, University of Wyoming, Laramie, WY 82071.

Executive Secretary: V. Claire Norton, P.O. Box 210, Fort Collins, CO 80522. Phone: 303-482-1038.

Treasurer: James R. Trammell, Jr., Arapahoe Community College, 5900 So. Santa Fe Drive, Littleton, CO 80120.

Director, Junior Academy: Elemer Bernath, 803 Ensign, Fort Morgan Co. 80701.

Editors: V. Claire Norton and Elmer Bernath, as above.

ACTIVITIES:

Membership: 300

Sections: Biological Sciences, Physical Sciences, Social Sciences.

School Students: Junior Academy, with participation in Academy annual meeting; Talent Search recognitions; Science Fairs participation; symposia; field trips; research grants.

College Students: Collegiate participation in Academy; research awards.

General Public: Science education symposia; provide consultants to governmental and commercial organizations; conservations of natural areas and archaeological sites.

Members: Annual meeting (April) hosting state or regional sections or chapters of AAPT, CBC, CRES, NAGT, and other professional groups; business meetings; Executive Committee, April and October; recognition of outstanding members.

Publications: Journal of the Colorado Wyoming Academy of Science (abstracts); CWAS Newsletter; CWJAS Newsletter.

Year of Founding: 1927.

Dues: 1982—Regular $10, Student—$4. Sustaining—$15; 1983 same.

*No new information is available. The above is reproduced from the 1982-1983 NAAS Directory.

FLORIDA ACADEMY OF SCIENCES

OFFICERS: April 1983 through 1984

Please note: Central office address: John Young Science Center, 810 East Rollins St., Orlando, FL 32803. (305) 896-7151

*Executive Officer (Executive Secretary): Mrs. Joyce E. Powers, 810 East Rollins St., Orlando, FL 32803. (305) 896 7151

President: Dr. Frank B. Wood, Department of Astronomy, University of Florida, Gainesville, FL 32611. (904) 392-2050

President-elect: Dr. James N. Layne, Archbold Biological Station, Rt 2 Box 180, Lake Placid, FL 33852. (305) 465-2571

Secretary: Dr. Patrick J. Gleason, 1131 North Palmway, Lake Worth, FL 33460. (305) 588-6793

Treasurer: Dr. Anthony F. Walsh, 5636 Satel Drive, Orlando, FL 32810. (305) 647-0118

*Director, Junior Academy: Mrs. Dorothy Henley, Cardinal Gibbons High School, 4520 NE 15th Terrace, Ft. Lauderdale, FL 33334. (305) 491-2900

Editor, Journal (Florida Scientist) or Proceedings: Dr. Walter K. Taylor, Department of Biological Sciences, University of Central Florida, Orlando, FL 32816. (305) 275-2917

Delegates to N.A.A.S.: Dr. Patrick J. Gleason, address above.

ACTIVITIES

Membership: 630

Sections: Agricultural Sciences, Anthropological Sciences; Biological Sciences; Computer Sciences and Mathematics; Engineering Sciences; Environmental Chemistry; Florida Committee on Rare and Endangered Plants & Animals: Geology and Hydrology; Medical Sciences; Physical, Atmospheric, Oceanographic, and Space Sciences; Science Teaching; Social Sciences; Urban and Regional Planning.

School Student: Junior Academy: Science Talent Search; Visiting Scientist Program; research grants; recognition of outstanding juniors and seniors.

School Teachers: Section of Academy.

Members: Business and scientific meeting (spring); field trips; recognition of outstanding members; student awards.

Publications: Journal

Year of Founding: 1936

Dues: Regular: 1983—$13.00; Student: 1983—$7.00; Sustaining: 1983—$25.00; Life: 1983—$300.00

*Continuous Appointment

GEORGIA ACADEMY OF SCIENCE

President: Dr. Douglas G Pohl, Department of Chemistry, Georgia College, Milledgeville, GA 31061. Phone: 912-453-4565

President-Elect: Ms. Carol Hill, Department of Anthropology, Georgia State University, Atlanta, GA 30303. Phone 404-658-2256

Secretary: Dr. Harry F. Bowsher, Department of Chemistry and Physics, Augusta College, Augusta, GA 30910. Phone: 404-828-3203

Treasurer: Dr. Dan Quisenberry, Department of Physics, Mercer University, Macon, GA 31207. Phone: 912-744-2598

Executive Director, Junior Academy: Dr. Don Berkowitz, Division of Science & Math, Abraham Baldwin Agricultural College, Tifton, GA 31793-4401. Phone: 912-386-3260

Editor, *Georgia Journal of Science:* Dr. Gayther L. Plummer, University of Georgia, Athens, GA 30602. Phone 404-542-1555

ACTIVITIES

Membership: 608

Sections: Biology; Chemistry; Earth Sciences; Physics, Mathematics, and Engineering; Biomedical Sciences; History and Philosophy of Science; Science Education; Anthropology; Psychology.

School Students: Junior Academy; Science Fairs

Publications: *Georgia Journal of Science*

Year of Founding: 1922

Dues: 1982—$8.00; 1983—$8.00

HAWAIIAN ACADEMY OF SCIENCE

OFFICERS: July 1, 1983 through June 30, 1984

P. O. Box 19703 Honolulu, Hawaii, 96817 Phone: (808) 537-1330

President: Dr. Philip Helfrich, Director, Hawaii Institute of Marine Biology, University of Hawaii 96822. Phone 247-6631

President-Elect: Dr. Doak Cox, Director, Environmental Center, University of Hawaii, 96822. Phone: 948-7362

Secretary: Dr. Arthur Mori, Chemistry Department, Chaminade University, 3140 Waialae Avenue, Honolulu, Hawaii, 96816.

Treasurer: Mr. Donald J. Mallin, Business man. 740 Kahili Street, Kailua, Hawaii, 96734

Councillors:

Dr. Paul Yuen, Immediate Past-President; Dean, College of Engineering, University of Hawaii.

Mr. Robert Cambell, College of Education, University of Hawaii; Director, Science and Engineering Fair.

Dr. Anne Catts, Pathology, Queen's Medical Center, Honolulu, Hawaii

Dr.Barbara Klemm, Curriculum Research and Development Group, University of Hawaii

Mr. Thomas Nordyke, student, John Burns Medical School, University of Hawaii.

Dr. Karl Swanholm, Department of Planning and Economic Development, State of Hawaii.

Membership: 420

Publications: Newsletter "Interface"; Journal (Science, Technology, Education)

Activities: Conferences for members and civic community; worksnops; Annual Science and Engineering Fair; Annual Student Marine Symposium; co-operative activities with colleague societies.

Dues: $10.00

IDAHO ACADEMY OF SCIENCE

OFFICERS: April 1983 through April 1984

Executive Secretary: Jack L. Dalton, Chemistry Department, Boise State University, Boise, Idaho 83725. Phone: 208-385-3975

President: Ross Floyd, Lewis-Clark State College, Lewiston, Idaho 83501

Vice-President: Rod Seeley, Department of Biology, Idaho State University, Pocatello, ID 83209

Secretary: Richard Snider, College of Southern Idaho, Twin Falls, Idaho 83301

Treasurer: David Redfield, Northwest Nazarene College, Nampa, Idaho 83651

Director: Jay Anderson, Idaho State University, Pocatello, Idaho 83201

Director: Morell Allred, Ricks College, Rexburg, ID 83440

Director: Richard Banks, Department of Chemistry, Boise State University, Boise, ID 83725

Editor, Journal or Proceedings: Duane LeTourneaun, Department of Bacteriology, University of Idaho, Moscow, ID 83843

Editor, Newsletter: Edward R. Matjeka, Chemistry Department, Boise State University, Boise, Idaho 83725

Delegates to N.A.A.S.: Robert Bratz, College of Idaho, Caldwell, Idaho 83605

ACTIVITIES

Membership: 160

Sections: Botany; Chemistry; Geology and Earth Science; Mathematics; Physics; Science Education; Zoology; Anthropology; Microbiology

Members: Annual business and scientific meeting (April).

Publications: Journal of the Idaho Academy of Sciences: Newsletter (Retort)

Year of Founding: 1958

Dues for regular members: 1983—$5.00, 1984—$5.00

ILLINOIS STATE ACADEMY OF SCIENCE

OFFICERS: April 1983 through April 1984

Central Office: Ms. Pat Zimmerman, Illinois State Museum, Springfield, Il 62706. Phone:217-782-6436.

President: Carol B. Axtell, Science Division, St. Louis Community College at Florissant Valley, 3400 Pershall Rd., St. Louis, MO 63135. Phone: 314-595-4392.

President-elect: Marcia Miller, Department of Basic Sciences, Peoria School of Medicine, P.O. Box 1649, Peoria, IL 61656. Phone: 309-671-3124.

Vice-President: Laszlo Hanzely, Department of Biological Sciences, Northern Illinois University, DeKalb, IL 60115.

Secretary: Laurence E. Crofutt, Department of Botany, Eastern Illinois University, Charleston, IL 61920. Phone: 217-345-5851.

Treasurer: John T. Williams, School of Medicine, Southern Illinois University, Carbondale, IL 62901.

President, Junior Academy: Carl Anderson, Rolling Meadows High School, 2901 Central Rd., Rolling Meadows, IL 60008. Phone: 312-253-5120.

Editor, Transactions: Anthony A Paparo. School of Medicine, Southern Illinois University, Carbondale, IL 62901. Phone: 618-536-5513.

Editor, Newsletter: Roberta M. Meehan, Department of Biological Sciences, Black Hawk College, 6600 34th Ave., Moline, IL 61265. Phone: 309-796-1311.

Delegate to N.A.A.S.: Robert C. Duty, Department of Chemistry, Illinois State University, Normal, IL 61761. Phone: 309-438-2697.

Librarian: Richard L. Leary, Illinois State Museum, Springfield, IL 62706. Phone: 207-782-6633.

ACTIVITIES

Membership: 1000

Sections: Agriculture; Anthropology and Archaeology, Applied Mathematics; Applied Science and Technology; Botany; Chemistry; Collegiate Chemistry; Computer Science; Environmental Science; Geology-Geography; Medical Science; Meteorology and Climatology; Microbiology; Physics and Astronomy; Science and Mathematics Teaching; Zoology.

School Students: Junior Academy, Science Talent Search; recognition of outstanding Students; research awards.

School Teachers: Science Teaching Section, Standing Committee on Science Teaching.

College Students: Collegiate Chemistry Section; research grants; awards for outstanding papers.

General Public: Conservation of natural areas and archaeological and historical sites; advice to governmental units; lectures and symposia.

Members: Business meetings; Scientific meeting (late weekend in April); symposia; field trips; recognition of outstanding scientists.

Publications: *Transactions of the Illinois State Academy of Science; Illinois Science News* (Newsletter).

Year of Founding: 1907

Dues: Regular Members—$15.00; Students—$7.50.

INDIANA ACADEMY OF SCIENCE

OFFICERS: January 1, 1983 through December 31, 1984

President: Alice S. Bennett, Department of Biology, Ball State University, Muncie, IN 47306. Phone: 317-285-6875

President-elect: Theodore S. Crovello, Department of Biology, University of Notre Dame, Notre Dame, IN 46556. Phone: 219-283-7031

Secretary: Richard L. Conklin, Department of Physics, Hanover College, Hanover, IN 47243. Phone: 812-866-2151

Treasurer: Duvall A. Jones, Department of Biology, Saint Joseph's College, Rensselaer, IN 47978. Phone: 219-866-7111

Director, Junior Academy: Leota Skirvin, Brown County High School, P. O. Box 68, Nashville, IN 47448. Phone: 812-988-2281

Editor, Proceedings: Donald R. Winslow, School of Education, Indiana University, Bloomington, IN 47405. Phone: 812-335-3196

Editor, Newsletter: Walter A. Cory, Jr., Coordinator for School Science, Memorial Hall West 108, Indiana University, Bloomington, IN 47405. Phone: 812-335-9785

ACTIVITIES

Membership: 1097

Sections: Anthropology; Botany; Cell Biology; Chemistry; Ecology; Engineering; Entomology; Environmental Quality; Geology and Geography; History of Science; Microbiology and Molecular biology; Physics and Astronomy; Plant Taxonomy; Science Education; Soil and Atmospheric Science; Zoology.

Students: Junior Academy; Science Fairs; Talent Search; Research Grants; Speakers Bureau.

General Public: Provide advice to governmental units; preservation of scientific areas; Speakers Bureau.

Members: Business meeting and field trips (April); annual meeting (November); recognition of outstanding Members (Fellows); research grants.

Publications: Proceedings of the Indiana Academy of Science (annual); Monographs (irregular; about biennial); Newsletter (quarterly).

Year of Founding: 1885

Dues: 1982—$5.00 ($10.00 with *Proceedings*); 1983—$5.00 ($10.00 with *Proceedings*)

IOWA ACADEMY OF SCIENCE

OFFICERS: April 22, 1983 through April 27, 1984

Please note: Central Office Address—P.O. Box 868, Cedar Falls, IA 50613 Phone: 319/273-2021

Executive Officer: James G. Macmillan, Department of Chemistry, University of Northern Iowa, Cedar Falls, IA 50614

Publications Director: Robert W. Hanson, Department of Chemistry, University of Northern Iowa, Cedar Falls, IA 50614

President: Duane C. Anderson, State Archaeologist, Department of Anthropology, University of Iowa, Iowa City, IA 52242

President-elect: Richard S. Wacha, Department of Biology, Drake University, Des Moines, IA 50311

Past-president: Harry T. Horner, Department of Botany, Iowa State University, Ames, IA 50011

Secretary: James G. Macmillan, as above

Treasurer: Frank Starr, Waterloo Community Schools, Waterloo, IA 50702

Director, Junior Academy: Lynn W. Glass, N156 Quadrangle, Iowa State University, Ames, IA 50011

Editors, PROCEEDINGS: Roger and Marilyn Bachmann, Department of Animal Ecology, Iowa State University, Ames, IA 50011

Editor, IAS BULLETIN: James Macmillan, as above

Editor, IOWA SCIENCE TEACHERS JOURNAL: Carl Boowinkel, Department of Teaching, Price Lab. School, University of Northern Iowa, Cedar Falls, IA 50614

Managing Editor, all publications: Robert W. Hanson, as above

Delegate to N.A.A.S.: James Macmillan, as above

Delegate to N.A.A.S.: Robert W. Hanson, as above

ACTIVITIES
Membership: 1400

Sections: Agricultural Sciences; Anthropology/Archaeology; Botany: Chemical Education; Conservation; Engineering; Geology; Inorganic, Analytical and Physical Chemistry; Organic and Biological Chemistry; Physics; Physiology; Psychology; Science Teaching; Zoology

School Students: Junior Academy; Science Talent Search; Science field programs (for Junior Academy—fall, spring, and summer); research competition and awards

School teachers: Recognition of outstanding teachers (Excellence in Science Teaching, Awards in Physics, Chemistry, Earth Science, Biology, Junior High Science, Elementary Science); workshops (Science Teachers Short Courses at Iowa State University, regional meetings) and Fall Conference for Science Teachers; Science Teaching Section

College Students: Special dues rate

General Public and Government: Developing a farm owned by the Academy into a model of environmental quality, good farm and conservation practice, and optimum income. Cooperation with Governor's Science Advisory Council and State agencies

Members: Business meeting (last weekend in April); scientific meeting (annual); Fall conference for science teachers

Publications: *Proceedings of the Iowa Academy of Science* (quarterly); Monograph—"Water Resources of Iowa", 1970 Junior Academy newsletter; *Iowa Science Teachers Journal* (3 issues per year); *The IAS Bulletin;* "Iowa's Natural Heritage", August 1982

Year of Founding: 1875

Dues for regular members: 1983—$15.00; 1984—$20.00

KANSAS ACADEMY OF SCIENCE

OFFICERS: 1983

Please note: Central Office Address--Division of Biological Sciences, Emporia State University, Emporia, Kansas, 66801

President: Dr. Dwight Spencer, Division of Biological Sciences, Emporia State University, Emporia, Kansas 66801

President-elect: Dr. H.L. Seyler, Department of Geography, Kansas State University, Manhattan, Kansas 66506

Vice-president: Dr. Dwight Platt, Department of Biology, Bethel College, North Newton, Kansas 671177

Secretary: Dr. Gaylen Neufeld, Division of Biological Sciences, Emporia State University, Emporia, Kansas 66801

Treasurer: Dr. Glenn Bellah, Department of Biology, Bethany College, Lindsborg, Kansas 67456

Director, Junior Academy: Dr. Edmund Shearer, Department of Chemistry, Fort Hays State University, Hays, Kansas 67601

Editor, Journal: Dr. A. Byron Leonard, State Biological Survey, 2045 Avenue A, Campus West, Lawrence, Kansas 66044

Associate Editor, Journal: Dr. Joseph T. Collins, Museum of Natural History, University of Kansas, Lawrence, Kansas 66045

Editor, Newsletter; Dr. John Ratzlaff, Department of Earth Sciences, Fort Hays State University, Hays, Kansas 67601

Delegate to N.A.A.S.: Dr. Gaylen Neufeld, as above

ACTIVITIES

Membership: 546

Publications: Transactions of the Kansas Academy of Science (quarterly): The Newsletter (quarterly)

Year of Founding: 1869

Dues: Regular—$16.00, Student—$10.00, Sustaining—$20.00, Junior Academy Group—$16.00, Organization—$20.00

Members: Annual Meeting, Science Talent Search, Tomanek Competition for graduate student papers at the annual meeting

KENTUCKY ACADEMY OF SCIENCE

OFFICERS: November 1982 to November 1983

President: J. B. Rodriguez, Department of Entomology, University of Kentucky, Lexington, KY 40546

President-Elect: Gary Boggess, College of Environmental Science, Murray State University, Murray, KY 42071

Vice President: Joe Winstead, Department of Biology, Western Kentucky University, Bowling Green, KY 42101

Secretary: Robert O. Creek, Department of Biological Sciences, Eastern Kentucky University, Richmond, KY 40475

Treasurer: Morris D. Taylor, Department of Chemistry, Eastern Kentucky University, Richmond, KY 40475

Director, Junior Academy: Herbert Leopold, Department of Health and Safety, Western Kentucky University, Bowling Green, KY 42101

Editor, Journal or Proceedings: Branley A. Branson, Department of Biological Sciences, Eastern Kentucky University, Richmond, KY 40475

Editor: Newsletter: Robert O. Creek, as above

Delegates to N.A.A.S.: John M. Carpenter, Department of Zoology, University of Kentucky, Lexington, KY 40506. Allen L. Lake, Department of Biological and Environmental Sciences, Morehead State University, Morehead, KY 40351

ACTIVITIES

Membership: 600

Sections: Antropology; Botany and Microbiology; Chemistry; Geography; Geology; Phychology; Physics; Physiology and Biophysics; Science Education, Sociology, Zoology and Entomology; Engineering.

School Students: Junior Academy; Regional Symposia and science Talent Search.

School Teachers and Students: KAS Foundation Research Funds

College Students: KAS Foundation Botany Research Fund

Members: Business Meeting and scientific meeting (November).

Publications: Transactions of Kentucky Academy of Science (twice yearly); Newsletter (biannual).

Year of Founding: 1914

Dues: 1983—$15.00

LOUISIANA ACADEMY OF SCIENCES

OFFICERS: February 1983 to February 1984

President: Margaret H. Peaslee, Department of Zoology, Louisiana Tech University, Ruston, LA 71272 (318) 257-4573

President-Elect: Edward W. Graham, College of Science, Northwestern State University, Natchitoches, LA 71457 (318) 357-5808

Secretary: Brad McPherson, Department of Biology, Centenary College, Shreveport, LA 71104 (318) 869-5209

Treasurer: Sigred Lanoux, Department of Chemistry, University of Southwestern Louisiana, Lafayette, LA 70504 (318) 231-6735

Director, Junior division: C.J. Probst, Department of Biology, University of New Orleans, New Orleans, LA 70148 (504) 286-6307

Director, State Science Fair: Clarence Hall, Department of Engineering Graphics, Louisiana State University, Baton Rouge, LA 70893(504) 388-5112

Editor, Journal or Proceedings: Lawrence M. Hardy, Department of Biological Sciences, LSU-Shreveport, Shreveport, LA 71115 (318) 797-5236

ACTIVITIES:

Membership: 350

Sections: Agriculture & Forestry, Botany, Microbiology, Zoology, Chemistry, Computer Sciences, Earth Sciences, Mathematics & Statistics, Physics, General Social Sciences, Industry & Economics, Behavioral Sciences, Science Teaching.

School Students: Junior Academy, Science Fair, Science Talent Search, recognition of outstanding students, research grants (AAAS), Speakers Bureau.

School Teachers: Annual Outstanding Science Teacher award.

General Public: Provide advice to governmental units; conservation of natural, historical, archaeological areas.

Members: Annual business and scientific meeting (February); Annual Distinguished Service Award; field trips.

Publications: Proceedings of the Louisiana Academy of Sciences; Newsletter

Year of Founding: 1927

Dues for regular members: 1983—$10.00/year.

MARYLAND ACADEMY OF SCIENCES

OFFICERS: Through Fall, 1983.

Please note: Central Office Address; Maryland Academy of Sciences, 601 Light Street, Baltimore, Maryland 21230

*Executive Director: Mr. James R. Backstrom, Central Office

Chairman of the Board: Mr. Howard I. Scaggs, Central Office

President: Dr. Owen M. Phillips, Central Office

Treasurer: Mr. Thomas D. Lowdermilk, Central Office

*Director, Education: Mrs. Mary Hyman, Central Office

*Director, Exhibits and Facilities: Mr. Dennis E. Zembower, Central Office

*Director, Davis Planetarium: Mr. Daniel Zirpoli, Central Office

*Director, Development and Finance: Mrs. Ellen A. Murphy, Central Office

*Editor: Mrs. Jean Zawitoski, Central Office

*Manager, Science Store: Mrs. Joanne Meekins

Delegate to N.A.A.S.: Mr. James R. Backstrom (as above)

*Continuous Appointment

ACTIVITIES:

Membership: 4,900

Section: Baltimore Astronomical Society

Education Programs: Maryland Science Talent Search; "Turn on to Science: courses; Maryland Junior Science and Humanities Symposium; Student Science Seminars;

lectures, excursions; films; gifted child programs; demo-stage programs; classroom programs in Science Center; workshops for teachers; career symposia.

Exhibits: Participatory exhibits, including Geology, Physics Playground, Science Arcade, Chesapeake Bay, and "The Computer Company." Also, The City, Illusions; Think Metric, Probability Machine, million volt van De Graff Generator; live animals and aquaria; various traveling exhibits—NASA vehicles, space art and photography shows.

Planetarium: Traditional constellation shows, astronomical and other multimedia shows; various school programs; special university-level programs on request; public observatory.

Members: Free admission to the Science Center and planetarium; discount in Science Store and on special programs; invitation to special events and openings; monthly newsletter. Invitations to "members only" events.

Membership Fees: 1983—$18.00 Invidivual; $24.00 Couple; $30.00 Family. Two-Year Memberships: $30.00 Individual; $40.00 Couple; $48.00 Family. Guest Privileges: $30.00 Individual, $42.00 Family. Senior Citizen rates available.

Publication: *VANGUARD*, monthly newlsetter.

Annual Award: "Maryland's Outstanding Young Scientist".

Year of Founding: 1797.

MICHIGAN ACADEMY OF SCIENCE, ARTS, AND LETTERS

OFFICERS: March 1983 through March 1984

Please Note: Central Office Address — 2117 Washtenaw Avenue, Ann Arbor, Michigan 48104.

President: Laurel Grotzinger, Dean, The Graduate College, Western Michigan University, Kalamazoo, MI 49008. Phone: 616-383-1660.

President-Elect: Gary Nash, Assistant Vice President for Academic Affairs, Ferris State College, Big Rapids, MI 49307. Phone: 616-796-9971.

Vice President; George McCloud, Associate Dean, Graduate School, Eastern Michigan University, Ypsilanti, MI 48197. Phone: 313-487-0379.

Secretary: To be elected.

Treasurer: Frank Zimmerman, Assistant to the Dean, Graduate School, The University of Michigan, 1020 Rackham Building, Ann Arbor, MI 48109. Phone: 313-764-8265.

Director, Junior Academy: James D. Edoff, 2384 Niagara, Troy, MI 48084.

Director, Collegiate Division: To be elected.

Editor, Journal or Proceedings: Enoch Brater, Central Office.

Editor, Newsletter: Joan Mahler, Central Office.

Delegates to N.A.A.S.: Enoch Brater, Central Office and one to be elected.

ACTIVITIES

Membership: 1,072

Sections: Administration; Anthropology; Asian Studies; Botany; Business and Health Care Administration; Cinema Studies; Communications (Telecommunications and Speech Studies); Economics; Education; Fine Arts; Fisheries and Wildlife; Folklore; Foreign Languages and Literatures; Forestry; Geography; Geology and Mineralogy; Gerontology; History; Language and Literature; Library Science; Medical Sciences; Medieval Studies; Music; Nursing; Philosophy; Physical Sciences: Political Science; Psychology; Recreation and Leisure Sciences; Religious Studies; Slavic and East European Studies; Sociology; Zoology.

School Students: Junior Academy.

Members: Business meetings; annual meeting of all sections involving presentation of papers (March-April); annual award and citations for outstanding member (annual).

Publications: *Michigan Academician* (tri-quarterly journal), *The Academy Letter* (periodic).

Year of Founding: 1894.

Dues for regular members: 1983—$17.00 and $20.00; 1984—$19.00 and $22.00.

Dues for students and retired professionals: 1983—$7.50 and $9.00; 1984—$9.00 and $11.00.

Other officers on file in the NAAS Treasurer's office.

MINNESOTA ACADEMY OF SCIENCE

OFFICERS: July 1983 through June 30, 1984

Please Note: Central Office address—916 Pioneer Bldg., St. Paul, MN 55101.

*Executive Officer: M.I. Harrigan, 916 Pioneer Bldg., St. Paul, MN 55101. Phone: 612-227-6361.

President: Dr. Connie Clark, 151 Norman Ridge Drive, Bloomington, MN 55437. Phone: 612-831-0521.

President-Elect: Dr. Wayland Ezell, 1729 - 10th Ave. S.E., St. Cloud, MN 56301. Phone: 612-253-3725.

Vice-President: Dr. Wayland Ezell, as above.

Secretary: Mr. Steven Ethen, 1227 - 17th Ave., Burnsville, MN 55337. Phone: 612-894-1326.

Treasurer: Mr. Steven Ethen, as above.

Director, Junior Academy: Mr. James Graf, 2710 N. Dale St., #308 Roseville, MN 55113. Phone: 612-482-1221.

Editor, Journal or Proceedings: Dr. Bradley Gottfried, 2140 Fairmount, St. Paul, MN 55105. Phone: 612-690-2999.

Editor, Newsletter: M.I. Harrigan, as above.

Delegate to N.A.A.S.: M.I. Harrigan, as above.

ACTIVITIES

Membership: 575

Sections: Anthropology; Biochemistry; Business and Economics; Physics; Chemistry; Earth Science; Geography; Zoology; Botany; History and Philosophy of Science; Science Education; Sociology; Natural & Scientific Areas; Economic Sciences; Minnesota Science Teachers' Association; Ecology; Chronobiology; Physiology & Genetics.

School Students: Junior Academy (with 21 affiliated science clubs); Science Fairs (8 regional plus State); Mathematics Contest (annual winners awarded U.S. Savings Bonds); Visiting Scientists Program; recognition of outstanding science club; West Virgina Youth Science Camp recommendations; grants-in-aid; research grants; annual Junior Science, Engineering, and Humanities Symposium (2½ days, in-house, with tours, speakers, seminars).

School Teachers: Recognition of outstanding Junior Academy chapter sponsor; sections of academy for teachers (Minn. Science Teachers' Ass'n., Minn. Ass'n. Physics Teachers, Science Education).

College Students: Collegiate participation in academy (with reduced dues); grants-in-aid; research grants.

General Public: Speakers Bureau; seminars; lectures; provide advice to government; conservation of natural areas; legislative activity.

Members: Business meetings (affiliated or represented with other organizations); annual scientific meeting (fall); field trips at annual meeting; recognition of outstanding members and non-members (officers elected in April, installed in July).

Publications: *Journal of the Minnesota Academy of Science* (3-4 issues per year); *MJAS Spectrum* (Junior Academy newspaper); *MSTA Newsletter* (science teachers; *MSTA Journal*) monthly Newsletter for members.

Year of Founding: 1873

Dues for regular members: 1982—$25.00; 1983—$25.00.

*continuous appointment

MISSISSIPPI ACADEMY OF SCIENCES

OFFICERS: July 1, 1983 through June 30, 1984

Central Office Address: 520 N. President Street, Jackson, Mississippi 39201.

*Executive Officer: Dr. Dudley F. Peeler, Jr., Neurosurgery Lab., University Medical Center, Jackson, MS 39216. (601) 987-5644.

President: Dr. Karen M. Yarbrough, P. O. Box 5002, University of Southern Mississippi, Hattiesburg, MS 39406. (601) 266-5002.

President-Elect: Dr. Lyman A. Magee, College of Liberal Arts, University of Mississippi, University, MS 38677. (601) 232-7177.

*Secretary: Dr. Dudley F. Peeler Jr., as above.

*Treasurer: Dr. Dudley F. Peeler Jr., as above.

Director, Junior Academy: Dr. Donald Cotten, Dept. of Science Education, University of Southern Mississippi, Hattiesburg, MS 39406. (601) 266-4920.

Editor, Journal: Dr. Allan G. Wehr, Drawer AW, Mississippi State University, Mississippi State, MS 39762. (601) 325-2480.

Editor, Newsletter: Dr. Dudley F. Peeler Jr., as above.

Delegate to N.A.A.S.: Dr. Lee N. Bolen, Department of Physics, University of Mississippi, University, MS 38677. (601) 232-7046.

ACTIVITIES

Membership: 771

Sections (Divisions): Agriculture and Plant Sciences; Chemistry and Chemical Engineering; Geology and Geography; Health Sciences; Mathematics, Computer Science, and Statistics; Microbiology; Oceanography and Meteorology; Physics, Mechanical, Electrical, and Civil Engineering; Psychology and Behavioral Neuroscience; Science Education; Zoology and Entomology.

School Students: Junior Academy; Research Grants; Science Talent Search; Recognition of outstanding students; special dues and registration rates.

School Teachers: Science Education Division of the Academy; recognition of teachers of outstanding students; MAS award for Significant Contributions to Science Teaching.

Members: Annual Meeting (spring); business meetings (several per year).

Publications: *Journal of the Mississippi Academy of Sciences;* Abstract Supplement to the Journal; Newsletter (4/yar).

General Public: Presentation of Outstanding Contributions to Science Award; Symposium of general interest at the Annual Meeting; Participation in the organiation and direction of the "Governor's Colloquium on Science, Engineering and Technology".

Year of Founding: 1930.

Dues for regular members: 1983—$10.00; 1984—$10.00.

Other officers on file in the NAAS Treasurer's office.

MISSOURI ACADEMY OF SCIENCE

OFFICERS: July 1, 1983 through June 30, 1984.

Office Address: P.O. Box 828, Kirksville, MO 63501.

President: Dr. Albert R. Gordon, Department of Life Sciences, Southwest Missouri State University, Springfield, MO 65802.

President-Elect: Dr. Donald H. Froemsdorf, Dean, College of Science, Southeast Missouri State University, Cap Girardeau, MO 63701.

Secretary: Dr. Albert G. Robertson, Department of Earth Science, Southeast Missouri State University, Cape Girardeau, MO 63701.

Treasurer: Elizabeth E. Topping, Department of Economics, Southwest Missouri State University, Springfield, MO 65802.

Director, Junior Division (Missouri Junior Academy of Science): Dr. Adell Thompson, School of Education, University of Missouri-Kansas City, Kansas City, MO 64110.

Director, Collegiate Division: Dr. Roland A. Hultsch, Department of Physics, University of Missouri-Columbia, Columbia, MO 65211.

Editor, *Transactions of the Missouri Academy of Science:* Dr. John R. Jones, Department of Fisheries and Wildlife, University of Missouri-Columbia, Columbia, MO 65211.

Delegate to NAAS: Dr. Dean A. Rosebery, Head, Science Division, Northwest Missouri State University, Kirksville, MO 63501.

ACTIVITIES:

Membership: 711

Sections: Agriculture; Biology; Bio-Medical; Chemistry; Conservation; Economics; Engineering; Environmental Science; Entomology; Forensic Science; Geography; Geology-Geophysics; Gerontology; Herpetology; Linguistics; Oncology; Physics; Psychology; Science Education; Science, Technology and Society; Social and Behavioral Science.

School Students: Junior Division, awards for best papers; research grants. Research scholarship for high school senior.

School Teachers: Outstanding Science Teacher Award; Secondary Science Teach Assistance Grants.

College Students: Collegiate Division awards for best papers ($50 maximum); research grants ($100 maximum).

General Public: Provide advice to governmental units; annual symposium on topic of current interest.

Members: Four business meetings per year; annual scientific meeting of all sections (April); symposium during annual meeting.

Publications: *Transactions of the Missouri Academy of Science* (annual); MAS Bulletin (quarterly).

Year of Founding: 1934.

Dues for Regular Members: 1982—$10.00; 1983—$10.00.

MONTANA ACADEMY OF SCIENCES

OFFICERS: July 1, 1983 through June 30, 1984

Please note: General Office Address—Department of Microbiology, University of Montana, Missoula, MT 59812

Executive Officer: Dr. John J. Taylor, Central Office

President: Dr. Loren Bahls, Central Office

Executive Secretary: Dr. John J. Taylor, Central Office

*Treasurer: Dr. Clarence A. Speer, Central Office

*Editor, Journal or Proceedings: Dr. John Tibbs, Department of Zoology, University of Montana, Missoula, MT 59812

Delegate to N.A.A.S.: Dr. John Tibbs, Central Office

ACTIVITIES

Membership: 235

Sections: Biological Sciences: Environmental Sciences and Engineering; Mathematics-Statistics-Computer Sciences; Microbiology; Physical Sciences; Social Sciences; Teaching of Sciences and Mathematics

School students: Research grants; participation awards

Members: Scientific meeting (March), business meetings (October and March); officers' terms begin July 1

Publications: Proceedings of the Montana Academy of Sciences with occasional specialized supplements

Year of Founding: 1940

Dues for Regular Members: 1982—$7.50, 1983—$7.59

*Continuous appointment

NEBRASKA ACADEMY OF SCIENCES, INC.

OFFICERS: May 1983 through April 1984

Please note: Central Office Address — 306 Morrill Hall, 14th and U Streets, Lincoln, NE 68588-0339.

Executive Director and Managing Editor: Dr. C. Bertrand Schultz, Central Office. Phone: 402-472-2662 (2644).

President: Dr. Ronald Weedon, Chadron State College, Biology Department, Chadron, NE 69337. Phone: 308-432-6385.

President-elect: Prof. Carroll L. Moore, Nebraska Wesleyan University, Physics Department, Lincoln, NE 68504. Phone: 402-466-2371.

Corresponding Secretary: Dr. Donald Woodburn, 301 Centennial Mall South, P.O. Box 94987, Nebraska Department of Education, Lincoln, NE 68509. Phone: 402-471-4329.

Recording Secretary: Mrs. Karen K. Messenger, University of Nebraska-Lincoln, Institute of Agriculture and Natural Resources, Conservation and Survey, Lincoln, NE 68588-0517. Phone: 402-472-3471.

Treasurer: Dr. Robert B. Johnston, University of Nebraska-Lincoln, Chemistry Department, Lincoln, NE 68588-0304. Phone: 402-472-3518.

Secretary, Junior Academy: Dr. Donald D. Woodburn, 301 Centennial Mall South, P.O. Box 94987, Nebraska Department of Education, Lincoln, NE 68509. Phone: 402-471-4329.

Co-Secretaries, Collegiate Divisions: Dr. Walter R. French, Nebraska Wesleyan University, Physics Department, Lincoln, NE 68504. Phone: 402-466-2371; and Dr. G. Gilbert McMillan, Union College, Science and Mathematics Department, Lincoln, NE 68506. Phone: 402-488-2331.

Editor, Journal or *Proceedings:* Dr. Albert Zechmann, University of Nebraska-Lincoln, Mathematics Department, Lincoln, NE 68588-0323. Phone: 402-472-2307.

Editor, Newsletter: Dr. C. Bertrand Schultz, Central Office.

Editor, *TRANSACTIONS:* Dr. Brent B. Nickol, 406 Manter Hall, Life Science, University of Nebraska-Lincoln, NE 68588-0118.

Delegate to N.A.A.S.: Professor Claire M. Oswald, College of Saint Mary, Biology Department, Omaha, NE 68124. Phone: 402-399-2609.

Delegate to N.A.A.S.: (alternate).

ACTIVITIES:

Membership: 578.

Sections: Anthropology, Biological and Medical Sciences, Dental Research, Chemistry, Physics, Earth Science, Engineering, History of Science, Philosphy of Science, Collegiate Academies.

Divisions: Greater Nebraska Association of Teachers of Science (GNATS) and the Institute for Tertiary-Quaternary Studies (TER-QUA).

School Students: Junior Academy with two active state sections; annual Mathematics contest; annual Science Talent Search; modified Visiting Scientist program.

General Public: The Nebraska Academy of Sciences is headquartered in the University of Nebraska State Museum and cooperates with the University in various scientific projects.

Members: Annual business and scientific meeting (weekend-middle of April). Eight affiliated state societies of chapters meet at same time (American Association of Physics Teachers; Lincoln Gem and Mineral Club; Nebraska Chapter National Council for Geographic Education; Nebraska Geological Society; Nebraska Section Mathematics Association of America; Nebraska Ornithologists' Union; Nebraska Psychological Association; Prairie/Plains Research Institute); also two divisions, nonmembers (Friend of Science Award); Policy Committee appointed by Presidents of each college and university.

Publication: Annual Proceedings (abstracts only); TRANSACTIONS annually; books (at times) such as symposia, guidebooks.

Year of Founding: 1880—103 years old.

Dues for Regular Members: 1981—$7.50; 1982—$7.50; 1983—$10.00. Collegiate Members: 1981—$1.00; 1982—$1.00; 1983—$3.00.

Office Secretary: Mrs. Richard (Valerie J.) Blake, Route 1, Box 15-O, Martell, NE 68404. Phone: 402-794-6925. Also Central Office. Phone: 402-472-2644 (2662).

Executive Director: Dr. C. Bertrand Schultz, Central Academy Office. Also N. 14 and Hilltop Road, Lincoln, NE 68521. Phone: 402-474-0640.

NEW JERSEY ACADEMY OF SCIENCE

OFFICERS: April 1983 through March 1984

Please Note: Central Office Address—Hill Center, Room 213, Box B, Rutgers University, Piscataway, N. J. 08854

Executive Secretary: Dr. James W. Green, 409 Grant Avenue, Highland Park, N. J. 08904 Phone: 201-249-4329

President: Dr. Alden McLellan, Institute for Hazardous & Toxic Waste, N. J. Institute of Technology, Newark, N. J. 07102. Phone: 201-645-5612

President Elect: Dr. Robert Simpson, Rider College, Biology Department, Lawrenceville, N. J. 08648 Phone: 609-896-5092

Secretary: Dr. Robin Zimmer, N. J. Marine Advisory Service, Building 22, Fort Hancock, N. J. 07732 Phone: 201-431-7920

Treasurer: Dr. Edmund W. Stiles, Rutgers University, Zoology Department, New Brunswick, N. J. 08903 Phone: 201-932-3607

Director of Junior Academy: Dr. David Sousa, Director of Sciences, The Public Schools, West Orange, 22 Municipal Plaza, West Orange, N. J. 07052 Phone 201-736-1200

Chairman of Grants-In-Aid: Dr. Louis Iozzi, Rutgers University, 105 Doolittle Hall, Piscataway, N. J. 08854 Phone: 201-932-9164

Editors of Newsletter: Dr. Leland Merrill, Jr., Princeton, N. J. 08540 Dr. Michael J. Sebetich, William Paterson College, Biology Department, Wayne, N. J. 07470 Phone: 201-595 2442

Editor of BULLETIN: Dr. A Lee Meyerson, Kean State College, Department of Geological Sciences, Union, N. J. 07083 Phone: 201-527-2064

ACTIVITIES

Membership 630

Sections: Arachaeology: Experimental Biology; Chemistry, Conservation; Geology; Ecology; Optometry; Psychology; Marine Biology; Coastal Zone Management; Plant Ecology; Marine Science; Parasitology; Animal Ecology; Aquatic Ecology; History of Science.

School Students: Junior Academy; Science Talent Search, recognition of outstanding students; research grants; grants-in-aid; outstanding award to a New Jersey high school teacher.

Members: Business meetings; scientific meetings; symposia; recognition of outstanding members.

Public Service: Provide advice to governmental units: conservation of natural areas.

Publications: The Bulletin, Newsletter; Special Publications (Pine Barrens Ecosystem and Landscape, Editor: Richard T. Forman, Publisher: Academic Press).

Affiliated Organizations: Academy of Medicine of New Jersey, American Chemical Society Monmouth County Section, American Chemical Society North Jersey Section, American Chemical Society South Jersey Section, American Littoral Society, Archaeological Society of America, New Jersey Academy of Optometry, New Jersey Institute of Chemists, New Jersey Society for Parasitology, New Jersey Psychological Association, New Jersey Science Teacher Association, Society of American Foresters—New Jersey Chapter, The Theobald Smith Society.

Year of Founding: 1954

Dues for regular members: 1983 $15.00

NEW MEXICO ACADEMY OF SCIENCE

OFFICERS: 1983

President: Dr. Marvin Wilkening, Graduate Office, N. M. Institute of Mining & Tech., Socorro, NM 87801. Phone: (505) 835-5513.

Pres.-Elect: Dr. Marcus Price, Univ. of N.M., Albuquerque, NM 84131

Vice-Pres.: Larry Stutts, 916 West Yucca, Clovis, NM 88101

Secretary: Mrs. Mary Ann Esquibel, APS Curriculm Center, P. O. Box 25704, Albuquerque, NM 87125. Phone: (505) 842-3731

Treasurer: Dr. Robert Amai, Div. of Sci. and Math., N. M. Highlands Univ., Las Vegas, NM 87701. Phone: (505) 425-7511

Dir., Junior Acad.: Steve Havill, Box 3253, Milan, NM 87021

Editor, Journal: Dr. Alex Burr, Physics Dept., N.M. State Univ., Box 3-D, Las Cruces, NM 88003

Delegate to N.A.A.S.: Dr. Lora M. Shields, Navajo Community College, Shiprock Campus, Shiprock, NM 87420

ACTIVITIES

Membership: 300

School Students: Junior Academy; Science Fair; Visiting Scientists Program; Summer Science Training Program; Seminars, Symposia.

School Teachers: Recognition of outstanding teachers; Seminars, Symposia.

General Public: Seminars; Lectures.

Members: Business and scientific meetings; Symposia; Recognition of outstanding scientists. (Officers elected in December)

Publications: New Mexico Journal of Science (Spring and Fall); Proceedings (in Journal); Newsletter; Junior Academy Newsletter; List of all scientific theses presented for graduate degrees in New Mexico institutions of higher learning (in Spring issue of Journal).

Year of Founding: 1902

Dues for Regular Members: 1983—$15.00

NEW ORLEANS ACADEMY OF SCIENCE

OFFICERS: 1983

President: Dr. Karlem Riess, 17 Audubon Boulevard, New Orleans, Louisiana 70118

Vice-President: Dr. Philip Pizzolato, 78 Fountainebleau Drive, New Orleans, Louisiana 70118

Secretary: Mr. Raymond C. Bergeron, 6729 Catina Street, New Orleans, Louisiana 70124

Treasurer: Dr. Joseph J. Kyame, Department of Physics, Tulane University, New Orleans, Louisiana 70118. Phone: 504-282-4518

ACTIVITIES

Membership: 100

General Public: Seminars; lectures

Members: Business meetings

Founding Year: 1853

Dues for regular members: 1981—$2.00; 1982—$2.00; 1983—$2.00

THE AMERICAN INSTITUTE OF THE CITY OF NEW YORK*

OFFICERS: February 1982 to February 1983.

Please note: Central Office address—37 Renee Road, Syosset, New York 11791.

Executive Officers: Robert F. Light, Central Office. Phone: (516) 921-2612.

President: Dr. Jerome F. Frederick, Central Office.

Vice-President: Kenneth Weissman, Central Office.

Secretary: Genevieve E. Peterson, Central Office.

Treasurer: Dr. Sidney A. Savitt, Central Office.

Director, Junior Academy: Genevieve F. Peterson, Central Office.

Editor, Journal or Proceedings: Robert F. Light, Central Office.

Delegate to N.A.A.S.: Kenneth Weissman, Central Office.

ACTIVITIES

School Science Fairs: The American Institute hold annual School ScienceFairs for students of public, private and parochial schools in grades 7-12. Five Fairs are held simultaneously in Borough Centers (Manhattan, Bronx, Brooklyn, Queens and Staten Island) followed by a City Wide Fair held at Queens College, Student Union Building, Flushing, New York. Five Major Winners (one from each Fair) compete at the International Science and Engineering Fair, all-expenses-paid.

Greater New York Metropolitan Math Fair: The American Institute makes gold certificate award annually for the best math paper in the metropolitan area.

A.A.A.S. Grant: If proposal to A.A.A.S. is approved. The American Institute awards grants to High School students for research projects.

Membership: 285

Year of Founding: 1828

Dues: 1982—$10.00 (regular); $25.00 (sustaining); $100.00 (life).

*The information is reproduced from the 1982-83 NAAS Directory.

NORTH CAROLINA ACADEMY OF SCIENCE, INC.

OFFICERS: March 83 to April 84

President: Dr. Raymond O. Flagg, Carolina Biological Supply Co., Burlington NC 27215.

President-elect: Dr. Charles Almy, Geology Dept., Guilford College, Greensboro NC 27410.

Vice President: Dr. Jim Gregory, Forestry Dept., NC State Univ., Raleigh NC 27607.

Secretary: Dr.. Gerhard W. Kalmus, Biology Dept., East Carolina Univ., Greenville NC 27834.

Treasurer: Dr. Edward Kuenzler, Dept. of Environmental Sci. and Engineering., UNC, Chapel Hill NC 27514.

Student Academy Executive Director: Dr. Jonathan Franz, Psychology Program, St. Andrews Presbyterian College, Laurinburg NC 28352.

Collegiate Academy Director: Dr. Michael Baranski, Dept. of Biology, Catawba College, Salisbury NC 28144

NORTH DAKOTA ACADEMY OF SCIENCE

OFFICERS: April 30, 1983 through April 28, 1984

Please note: Central Office Address—P. O. Box 8123 University Station, Grand Forks, ND 58202

Executive Officer: Dr. A. William Johnson, Central Office, Phone: 701-777-2784

President: Dr. Gary Clambey, Botany Department, North Dakota State University, Fargo, ND 58105

President-Elect: Dr. Michael Thompson, Minot State College, Minot, ND 58701

Secretary-Treasurer: Dr. A. William Johnson, as above

Director, Junior Academy: Dr. Donald Scoby, Botany Department, North Dakota State University, Fargo, ND 58105

Editor, Journal or Proceedings: Dr. A. William Johnson, as above

Delegate to N.A.A.S.: Dr. Michael Thompson, as above

ACTIVITIES

Membership: 478

College Students: A. Rodger Denison Research and oral presentation competition with prizes.

School Students: Science Fair; Junior Academy of Science: High School Student Research Grants.

Members: Annual Meeting (last weekend in April)

Publications: Proceedings of the North Dakota Academy of Science.

Year of Founding: 1908

Dues for regular members: 1983—$10.00

THE OHIO ACADEMY OF SCIENCE

OFFICERS: April 23, 1983 through April 27, 1984

Please note: Central Office Address—445 King Avenue, Columbus, Ohio 43201

*Executive Officer: Lynn Edward Elfner, Central Office Phone: (614) 424-6045

President: Dr. Jane M. Decker, Department of Botany and Bacteriology, Ohio Wesleyan Universtiy, Delaware, Ohio 43015

President-elect: Robert E. Madaffer, 298 North Stanwood Road, Columbus Ohio 43209

Vice-president: 19 Vice-presidents, one per Technical Section

Secretary: Andrew M. White, Biology Department, John Carroll University, University Heights, Ohio 44118

Treasurer: Professor Robert H. Essman, Department of Genetics, The Ohio State University, 1735 Neil Avenue, Columbus, Ohio 43210

Director, Junior Academy: Dr. Paul M. Daniel, Department of Zoology, Miami University, Oxford, Ohio 45056

Editor, Journal or Proceedings: Dr. Tim M. Berra, The Ohio State University-Mansfield, Mansfield, Ohio 44906

Editor, Newsletter: Edward L. Corley, 2001 Main Cross Street, P. O. Box 191, Eldorado, Ohio 45321

Delegate to N.A.A.S.: Lynn Edward Elfner, as above

Delegate to N.A.A.S.: Dr. Charles M. Vaughn, Department of Zoology and Physiology, Miami University, Oxford, Ohio 45056

ACTIVITIES

Membership: 1,500

*Continuous Appointment

Sections: Zoology; Plant Sciences; Geology; Medical Sciences; Physics & Astronomy: Geography; Chemistry; Science Education; Anthropology & Sociology; Conservation; Genetics and Cell Biology; Mathematics & Computer Sciences; Psychology; Junior Academy; Engineering; Administrative Sciences & Planning; Economics; Ecology; Information & Library Sciences

School Students: Junior Academy promotes local, district and state science days; Junior Academy Section for high school students; Ohio Student Research Grants; Science Day Alumni Club; Westinghouse Science Talent Search; Buckeye Science & Engineering Fair.

School Teachers: Recognition of outstanding science and math teachers (one from each of 13 districts); Science Education Committee and Science Education Section of Academy; Battelle/Krecke. Award—selection of 13 outstanding high school science and 13 outstanding math departments each year—financial support from Battelle Memorial Institute; Battelle Award for Professional Development.

College Students: Undergraduate papers at Annual Meeting

General Public: History of Science Meeting; Ecology Symposia and Annual Meeting open to the public; provide advice to governmental units as requested.

Members: Two Council meetings, 6-10 Executive Committee meetings, and Annual Meeting (April) each year; symposia including History of Science and Ecology; field trips at Annual Meeting; curriculum studies (Education Committee; recognition of outstanding members by election as Fellows or Life Members); members are eligible to join the BMI Federal Credit Union.

Publications: *The Ohio Journal of Science; Technical Writing Style Guide; Ohio Academy of Science NEWS* for 10,000 science teachers, members and others; Corporation/Institution *Letter; Ohio's Natural Heritage Book; Proposal Guide*

Year of Founding: 1891

Dues for regular members: 1983—$22.00, 1984—$22.00

OKLAHOMA ACADEMY OF SCIENCE

OFFICERS: 1983

President: Dr. John R. Sokatch, Department of Microbiology and Immunology, University of Oklahoma Health Science Center, P.O. Box 26901, Oklahoma City, OK 73190.

President Elect: Dr. Mary Whitmore, Department of Zoology, The University of Oklahoma, 730 Van Vleet Oval, Norman, OK 73019.

Recording Secretary: Dr. Paul F. Nighswonger, Biology Department, Northwest Oklahoma State University, Alva, OK 73717.

Executive Secretary: Dr. L. Vernon Scott, Department of Microbiology and Immunology, University of Oklahoma Health Sciences Center, P.O. Box 26901, Oklahoma City, OK 73190.

Chairman, Junior Academy Section: Mr. Jimmie Pigg, 401 Rock Place, Moore, OK 73160

Chairman, Collegiate Academy Section: Dr. John Korstad, Depatrment of Natural Sciences, Oral Roberts University, 7777 South Lewis, Tulsa, OK 74171.

Editor, Proceedings or Annals of the Oklahoma Academy of Science, or Organizer of a Symposium: Dr. Glenn W. Todd, Department of Botany, Oklahoma State University, Stillwater, Ok, 74074.

ACTIVITIES:

Membership: approximately 924.

Sections: Biological Sciences; Geology; Physical Sciences; Social Sciences; Science Education; Geography; Wildlife Conservation; Microbiology; Engineering Science; Biochemistry-Biophysics; Electron Microscopy; Collegiate Academy; Junior Academy.

College and High School Students: Collegiate Academy recognition of outstanding students (winner of Collegiate Academy research paper presentation); research grants; Junior Academy (regional and state meetings); recognition of outstanding students; scholarships (winner of Junior Academy paper competition); research grants (AAAS).

Secondary School Teachers: Participate in Science Education section of the Academy and attend Field Meetings.

General Public: Provide advice to governmental units and secondary school systems; conservation of natural areas (support through resolutions); visiting scientists program upon request.

Meetings: Annual Technical Meetings (election of officers, November); Spring Field Trip (April); Fall Field Trip (September); Collegiate Academy Meeting (February); Junior Academy Meeting (April); Executive Council Meetings (on a monthly basis as set by the president).

Publications: *Proceedings of the Oklahoma Academy of Science* (annually); newsletter on relevant items of discussion and information.

Year of Founding: 1909

Dues for Regular Members: $15.00/year.

OREGON ACADEMY OF SCIENCE

OFFICERS: February, 1983 through February, 1984.

President: Jay F. Evett, Department of Natural Sciences and Mathematics, Western Oregon State College, Monmouth, OR 97361.

President-Elect: Michael L. Cummings, department of Earth Sciences, Portland State University, Portland, OR 97207.

Past-President: Neal R. Bandick, Department of Natural Sciences and Mathematics, Western Oregon State College, Monmouth, OR 97361.

Secretary: Susan K. Humphreys, Western Oregon State College, Monmouth, OR 97361.

Treasurer: Frederick A. Hirsch, P.O. Box 307, Monmouth, OR 97361.

Director, Junior Academy: Lewis H. Schaad, Crescent Valley High School, 4444 N. W. Highland Drive, Corvallis, OR 97330.

Editor, Proceedings: Jay F. Evett, as above.

Membership Chairman: Donald B. Unger, Kerr Library, Oregon State University, Corvallis, OR 97331.

Delegate to N.A.A.S.: Jay F. Evett, as above.

Newsletter Editor: Carolyn Browne, 1831 S. W. Park 112, Portland, OR 97201.

ACTIVITIES

Membership: 153.

Sections: Anthropology; Biology; Chemistry-Mathematics-Physics; Geography; Geology; Linguistics; History of Science.

School Students: Junior Academy; research grants.

General Public: Seminars, lectures (in association with Annual Meeting).

Members: Business and scientific meetings (last Saturday in February); Symposia; Recognition (citations) for outstanding scientific achievement.

Publications: Proceedings (annual); Newsletter (quarterly).

Year of Founding: 1892.

Dues for regular members: 1983—$6.00' 1984—$6.00.

PENNSYLVANIA ACADEMY OF SCIENCE

OFFICERS: April 1982 to April 1984

President: Stanley J. Zagorski, Gannon University, Associate Dean, College of Science and Engineering, Erie, PA 16541. (814) 871-7618.

President-Elect: George C. Shoffstall, Director of Education and Organizational Development, Western Pennsylvania Hospital, 4800 Friendship Ave., Pittsburgh, PA 15224. (412) 578-6884.

Immediate Past President: Bruce D. Martin, Duquesne University, Vice President for Academic Affairs, Pittsburgh, PA 15219. (412) 434-5080.

Treasurer: Michael L. Bucholtz, Gannon University, Department of Chemistry, Erie, PA 16541. (814) 871-7643.

Assistant Treasurer: Ernest H. Braue, Jr., The Pennsylvania State University, Mont Alto Campus, Department of Chemistry, Mont Alto, PA 17237. (717) 749-3111.

Editor, Proceedings: Shyamal K. Majumdar, Lafayette College, Department of Biology, Easton, PA 18042. (215) 250-5464.

Corresponding Secretary: David S. Ostrovsky, Millersville University, Biology Department, Millersville, PA 17551. (717) 872-3420.

Recording Secretary: Viola Yakstis, 131 S. 17th Street, Pittsburgh, PA 15203. (412) 355-6014.

Editor, Newsletter: Kurt C. Schreiber, Duquesne University, Department of Chemistry, Pittsburgh, PA 15219. (412) 434-6341.

Director, Junior Academy: Clarence Myers, Knoch High School, Saxonburg, PA 16506. (412) 352-9451.

Delegate to N.A.A.S.: Sister M. Gabrielle Maze, Grove and McRobert Road, Pittsburgh, PA 15234 (412) 881-4878.

Delegate to N.A.A.S.: George C. Shoffstall, as above.

Historian: J. Robert Halma, Cedar Crest College, Allentown, PA 18104. (215) 437-4471.

ACTIVITIES:

Membership: 690

Publications: Proceedings (biannually); Newsletter (quarterly); Books (irregularly).

School Students: Junior Academy; Science Fairs; Science Talent Search; Visiting Scientists Program; Speakers Bureau; High School career (science) days; Recognition of Outstanding Students; Scholarships; Research Grants; Workshops.

Members: Annual scientific meeting; seminars; Darbaker award for outstanding research paper.

Year of Founding: 1924.

ACADEMY OF SCIENCE OF ST. LOUIS

Please note: Central Office Address-Oak Knoll Park, Clayton, Mo. 63105

President: Jules D. Campbell, 4 westerly Ln., St. Louis, Mo. 63124 Phone 314-993-0517

Vice-President: Robert Stupp, Stupp Bros., Box 6600, St. Louis, Mo. 63114. 314-638-5000

Secretary: Mrs. Stuart Symington, Jr., Ph.D. 745 Cella Rd., St. Louis, Mo. 63124. 314-994-3233

Treasurer: Thomas G. McNearney, 15 Trent Dr., St. Louis, Mo. 63124 314-993-1010

Exec. Secretary: Susan S. Schepman, Museum of Science, Oak Knoll Park, Clayton, Mo. 63105. 314-726-2888

Delegate to N.A.A.S.: J. Brian Barry, Science Dept., St. Louis Priory School, 500 S. Mason Rd., St. Louis, Mo. 6314

ACTIVITIES

Membership: 1400

1. Sponsors lectures on scientific matters.
2. Funds the publication of pamphlets on scientific matters or items of general interest.
3. Assists in funding of archaeological projects.
4. Provides awards for outstanding papers presented by students participating in the Science Career Program of the Museum of Science and Natural History.
5. The "Friends of the Science Museum", an affiliate of the Academy of Science of St. Louis, is a fund-raising organization which operates "The Shop for Science" and hosts various fund-raising events.

Year of Founding: 1856

Dues for regular membership: $25.00

SOUTH CAROLINA ACADEMY OF SCIENCE

OFFICERS: April 1983 to April 1984

President: Gerald T. Cowley, Department of Biology, University of South Carolina, Columbia, SC 29208.

President-Elect: Charles F. Beam, Jr., Department of Chemistry, College of Charleston, Charleston, SC 29424.

Vice-President: Robet C. Nerbun, Jr., Dept. Sci. Engineering, University of South Carolina at Sumter, Sumter, SC 29150.

Secretary: H. E. Scheiblich, Department of Mathematics and Statistics, University of South Carolina, Columbia, SC 29208.

Treasurer: John L. Safko, Department of Physics, University of South Carolina, Columbia, SC 29208.

Director, Junior Academy: Robert C. Nerbun, Jr., as above.

Editor, Journal or Proceedings: E. F. Thompson, Jr., Department of Biology, University of South Carolina, Columbia, SC 29208.

Editor, Newsletter: Mike Welsh, Provost's Office, University of South Carolina, Columbia, SC 29208.

ACTIVITIES AND GOALS

Goals: To raise the level of science education in South Carolina and to promote the creation, dissemination and propogation of scientific knowledge.

Membership: 434

Sections: Biology; Chemistry; Physics; Economics; Philosophy; Psychology.

School Students: Junior Academy; science club activities; Jr. Academy Newsletter; Science Fairs (5 regions); science research awards; West Virginia Youth Science Camp in cooperation with State Department of Education; S. C. Academy of Science research grants; recognition of outstanding research through trip to AAAS and American Jr. Academy of Science Annual Meeting.

School Teachers: Recognition of outstanding science teachers (Cryovac Award - $250).

College Students: Student memberships at reduced rates.

Members: Annual scientific meeting (March); awards given for outstanding research papers presented at annual meeting.

Publications: Bulletin including abstracts of papers presented at meeting; Junior Academy transactions; Newsletters for Jr. and Sr. Academy.

Year of Founding: 1924.

Dues for regular members: 1982—$10.00; 1983—$10.00.

SOUTH DAKOTA ACADEMY OF SCIENCE*

OFFICERS: April 1982 to April 1983.

Please note: Central Office address—School of Business, University of South Dakota, Vermillion, SD 57069.

President: Dr. Ted Van Bruggen, Biology Department, University of South Dakota, Vermillion, SD 57069. Tel. 605-677-5211.

President-elect: Dr. L. Cliff Lewis, Department of Chemistry, Sioux Falls College, Sioux Falls, SD 57197. Tel. 605-331-5000.

Vice-President: Dr. Maureen Diggins, Department of Biology, Augustana College, Sioux Falls, SD 57197. Tel. 605-336-0770.

Secretary-Treasurer: Dr. Peter Maldonado, School of Business, University of South Dakota, Vermillon, SD 57069. Tel. 605-677-5271.

Director, Junior Academy: Marvin Selnes, Patrick Henry Junior High School, 2200 S 5, Sioux Falls, SD 57105. Tel. 605-339-1540.

Editor, Proceedings: Dr. Carrol Hanten, RR 3, Pierre, SD 57501. Tel. 605-224-7136.

ACTIVITIES:

Membership: 182

Sections: Physical; Biological.

School Students: Junior Academy; Speakers Bureau; Awards; Scholarships.

School Teachers: Recognition of Outstanding Teachers (OABT); "3M" Outstanding Physical Sciences Teacher.

College Students: Collegiate Academy.

General Public: Speakers Bureau; special committee for Nature Conservancy.

Members: Business meetings (on call); Scientific meeting (April); symposia and field trips; recognition of outstanding members.

Publications: Proceedings; newsletters.

Year of Founding: 1915.

Dues for regular members: $7.00.

*No new information was available. The above is reproduced from the 1982-83 directory.

SOUTHERN CALIFORNIA ACADEMY OF SCIENCES

OFFICERS: 1983

Office: 900 Exposition Blvd., Los Angeles, CA 90007. (213) 744-3384.

President: Dr. Richard E. Pieper, Dept. Biol. Sciences, University of Southern California, Los Angeles, CA 90089.

Vice-President: Peter L. Haaker, California Dept. of Fish and Game, 1301 W. 12th St., Long Beach, CA 90813.

Secretary: Dr. Camm C. Swift, Los Angeles County Museum of Natural History, 900 Exposition Blvd., Los Angeles, CA 90007.

Treasurer: Dr. Robert G. Zahary, Biology Dept., California State University, Los Angeles, CA 90032.

Director, High School Division: Gloria J. Takahashi, 2815 Kiska, Hacienda Heights, CA 91745.

Technical Editor, Journal: Dr. Robert J. Lavenberg, Los Angeles County Museums of Natural History, 900 Exposition Blvd., Los Angeles, CA 90007.

Managing Editor, Journal: Gretchen Sibley, Los Angeles County Museum of Natural History, 900 Exposition Blvd., Los Angeles, CA 90007.

Editor, Newlsetter: Margaret Barber, Southern California Academy of Sciences, 900 Exposition Blvd., Los Angeles, CA 90007.

ACTIVITIES:

Membership: 400

Sections: Biology, Botany, Earth Sciences, Invertebrate Zoology, Vertebrate Zoology, Anthropology and Archaeology, History, Folklore and Mythology.

College Students: Recognition of outstanding students by awards made each year for the best student papers presented at the Academy's Annual Meeting (May).

High School Students: Selected by application for six-month research training projects under individual direction of professional scientists.

Publications: *Bulletin* (journal: three/year); newsletter.

Year of Founding: 1896.

Dues: Regular members, $12.00; Students, $8.00; Life, $150.00.

TENNESSEE ACADEMY OF SCIENCE

OFFICERS: 1983

President: Dr. Gordon Morris, Department of Biological Sciences, UT Martin, Martin, TN 38237.

President-Elect: Dr. Robert L. Wilson, Department of Geosciences, University of Tennessee, Chattanooga, TN 37402.

*Secretary: Dr. Diane R. Nelson, Box 22900A, Department of Biological Sciences, East Tennessee State University, Johnson City, TN 37614.

*Treasurer: Dr. R.K. Fletcher, Box 5171, Tennessee Tech University, Cookeville, TN 38501.

*Director, Junior Academy: Dr. William N. Pafford, Box 22900A, Department of Biological Sciences, East Tennessee State University, Johnson City, TN 37614.

*Director, Collegiate Division: Dr. Richard J. Raridon, 111 Columbia Drive, Oak Ridge, TN 37830.

•Editor, Journal or Proceedings: Dr. Gus Tomlinson, Tennessee State University, Tenth & Charlotte Avenue, Nashville, TN 37203.

•Delegate t[illegible]A.A.S.: Dr. Richard J. Raridon, as above.

•Visiting Scientists Program: Dr. Bernard W. Benson, Department of Curriculum and Instruction, Center for Environmental Education, University of Tennessee at Chattanooga, Chattanooga, TN 37402.

ACTIVITIES

Membership: 800

Sections: Botany, Chemistry; Engineering; Geology-Geography; Mathematics; Medical Sciences; Physics-Astronomy; Science-Mathematics Teachers; Zoology.

School Students: Junior Academy; Science Talent Search; Visiting Scientists Program; research grants (AAAS).

School Teachers: Section of Academy; distinguished H.S. Teacher Award

College Students: Collegiate Academy; seminar exchange program in chemistry; other scholarships at Tech. Aqua. Station in summer session.

Members: Annual business and scientific meetings (November); recognition of outstanding members (Fellows); and nonmembers (honorary membership).

Publications: Journal (quarterly); Junior Academy transaction (annual); Junior Academy handbook (annual); Visiting Scientists Program Roster (annual).

Year of Founding: 1912

Dues for regular members: 1980—$10.00; 1981—$15.00

Dues for students and Emeritus members: 1981—$8.00

•Continuous Appointment

TEXAS ACADEMY OF SCIENCE

OFFICERS: March 1, 1983 to March 1, 1984

Please Note: Central Office Address — Box 2175, Sam Houston State University, Huntsville, TX 77341-2175. Phone: 409-294-1047.

President: Bernard T. Young, P.O. Box 11025, ASU Station, Angelo State University, San Angelo, TX 76909. Phone: 915-942-2169.

Past President: Elray S. Nixon, P.O. Box 13003, Stephen F. Austin State University, Nacogdoches, TX 75962. Phone: 409-569-3601

President Elect: Michael J. Carlo, P.O. Box 10986, Angelo State University, San Angelo, TX 76909. Phone: 915-942-2184.

Vice President: William J. Clark, Wildlife & Fisheries Sciences, Texas A&M University, College Station, TX 77843. Phone: 409-845-5777.

Secretary-Treasurer: Everett D. Wilson, Life Sciences Department, Sam Houston State University, Huntsville, TX 77341. Phone: 409-294-1555.

Counselors, Junior Academy: Ruth Spear, 201 E. Mimosa Creek, San Marcos, TX 78666. Phone: 512-392-8141. Peggy Carnahan, 7239 Bridle Path, San Antonio, TX 78240. Phone: 512-673-1110.

Counselors, Collegiate Academy: Shirley Handler, East Texas Baptist College, Marshall, TX 75670. Phone: 214-938-1905. Helen Oujesky, University of Texas at San Antonio, Department of Allied Health and Life Sciences, San Antonio, TX 78285. Phone: 512-691-4457.

Editor, Journal or Proceedings: William H. Neill, Wildlife & Fisheries Sciences, Texas A&M University, College Station, TX 77843. Phone: 409-845-5777.

Editor, Newsletter: James D. Long, Life Sciences Department, Sam Houston State University, Huntsville, TX 77341. Phone: 409-294-1550.

Delegate to N.A.A.S.: Arthur E. Hughes, Department of Education, Sam Houston State University, Huntsville, TX 77341. Phone: 409-294-1135.

Research Grants Committee Chairman: Reese Duke, Box 1892, Rice University, Houston, TX 77001. Phone: 713-527-8101.

ACTIVITIES:

Membership: 600

Sections: Mathematics; Physical Sciences; Earth Sciences; Biological Sciences; Social Sciences; Environmental Sciences; Chemistry; Science Education; Computer Science; Aquatic Science.

School Students: Junior Academy; Science Fairs; Exxon Research Grants.

College Students: Collegiate Academy; quarterly newsletter (*TASCA*).

Members: Annual business and scientific meetings (March) with symposia and field trips; recognition of outstanding members.

Publications: *Texas Journal of Science:* Collegiate Academy quarterly newsletter (*TASCA*); Texas Academy of Science Newlsetter (*TASNews*) published biannually.

Year of Founding: 1928 (Chartered 1929)

Dues for Regular Members: 1983—$20.00; 1984—$20.00.

Other officers on file in NAAS treasurer's office.

UTAH ACADEMY OF SCIENCES

OFFICERS: March 25, 1983 to March 25, 1984.

Please Note: Central Office address—College of Family, Home, and Social Sciences, 990 Spencer W. Kimball Tower, Brigham Young University, Provo, UT 84602. Phone: 801-378-2083.

Executive officer: Joyce Penrod, central office.

President: Gar W. Workman, Department of Wildlife Sciences, Utah State University, Logan, UT 84322. Phone: 801-750-2461.

President-elect: Albert L. Fisher, Department of Geography, 270 Orson Spencer Hall, University of Utah, Salt Lake City, UT 84112. Phone: 801-581-8366.

Past President: Martin B. Hickman, College of Family, Home, and Social Sciences, 990 Spencer W. Kimball Tower, Brigham Young University, Provo, UT 84602. Phone: 801-378-2083.

General Secretary: Joyce Penrod, central office.

Director, Junior Academy: E. Park Guymon, Department of Chemistry, Weber State College, Ogden, UT 84408. Phone: 801-626-6952.

Associate Director (Science), Junior Academy: Walter Buss, 2820 Liberty Avenue, Ogden, UT 84408. Phone: 801-394-0162.

Associate Director (Letters), Junior Academy: Darwin L. Hayes, Department of English, 3165 Jesse Knight Humanities Building, Brigham Young University, Provo, UT 84602. Phone: 801-378-3482.

Editor, *Encyclia:* Jean Anne Waterstradt, Department of English, 3128 Jesse Knight Humanities Building, Brigham Young University, Provo, UT 84602. Phone: 801-378-3385 or 801-378-3053.

Director of Public Relations, Junior Academy: Lane A. Compton, Graduate Administration, B-345 Abraham Smoot Building, Brigham Young University, Provo, UT 84602. Phone: 801-378-3337.

Agent for Investments: Larry V. Knight, Department of Physics, 296 Eyring Science Center, Brigham Young University, Provo, UT 84602. Phone: 801-378-2186.

Chairman, Division of Arts: John Elzey, School of Arts and Humanities, Weber State College, Ogden, UT 84408. Phone; 801-626-6615.

Chairman, Division of Biological Sciences: Clyde J. Hurst, Utah State University, Extension Agent, Box Elder County Courthouse, Brigham City, UT 84302. Phone: 801-734-2031.

Chairman, Division of Letters: Glenn Wiese, Department of English, Weber State College, Ogden, UT 84408. Phone: 801-626-6000.

Chairman, Division of Library Media and Instructional Sciences: R. Kent Wood, Department of Instructional Media, Library 222, Utah State University, Logan, UT 84322. Phone: 801-750-2688.

Chairman, Division of Social Sciences: Larry R. Gerlach, Department of History, 116 Carlson Hall, University of Utah, Salt Lake City, UT 84112. Phone: 801-581-3835.

Chairman, Division of Physical Sciences: Haven E. Bergeson, Department of Physics, 201 North Physics Building, University of Utah, Salt Lake City, UT 84112. Phone: 801-581-7115.

Awards Chairman: LeGrande Ellis, Department of Biology, UMC-53, Utah State University, Logan, UT 84322. Phone: 801-750-2563.

Membership Chairman: Kent Robson, Department of Philosophy, Utah State University, Logan, UT 84322. Phone: 801-750-1214.

Public Relations: Paul Cracroft, Kingsbury Hall Room 210, University of Utah, Salt Lake City, UT 84112. Phone; 801-581-6261.

ACTIVITIES

Membership: 400

Sections: Arts Division; Biological Sciences; Letters Division; Library and Informational Sciences; Physical Sciences Division; Social Sciences Division.

School Students: Junior Academy; Science Fairs (two regional); Language Fairs; Mathematics Contest; Science Talent Search; research grants; recognition of outstanding students.

School Teachers: Meritorious teaching awards to two high school teachers in the social and biological sciences.

Members: Business meeting (April); scientific meetings (one per year); symposia (with scientific meetings); occasional field trips; recognition of outstanding members (at least two Distinguished Service Awards annually); in alternate years, present prizes of at least $1,500 (from endowed funds) for outstanding contributions in Arts and Letters and Social Sciences, and in Physical and Biological Sciences; annual prize of $500 for the best paper published in the Proceedings.

Publications: *Encyclia: The Journal of the Utah Academy of Sciences, Arts and Letters;* newsletter.

Year of Founding: 1908.

Dues for regular members: 1981—$10.00; 1982—$10.00; 1983—$10.00.

Other officers are on file in NAAS Treasurer's office.

VERMONT ACADEMY OF ARTS AND SCIENCES

OFFICERS: 1982 and 1983.

Please Note: Central Office, Box 723, Middletown Springs, VT 05757.

Executive Director: Frances B. Krouse, Central Office, Phone (802) 235-2302.

President: H. Donn McCafferty, 120 Sunset Drive, Waterbury Center, VT 05677. Phone: (802) 224-8033.

Vice President: Frances B. Krouse, South Street, Middletown Springs, VT 05757. Phone: (802) 235-2302.

Secretary: Joyce Adler, North Bennington, VT 05257. Phone: (802) 442-2268.

Treasurer: Ronald J. Iverson, Kelly Road, Underhill, VT 05489. Phone: (802) 899-3061.

ACTIVITIES:

Membership: 209

Membership Development Programs: Several membership drives. Professor Peter Arnott, Chairman of the Drama Department , Tufts University, in a series of his Marionette Theatre presentations, will perform at a number of locations throughout Vermont in 1983.

Annual Meeting: October 1983. Location and date to be announced.

Annual Art Exhibit: April 1984. To be held at Castleton State College, Castleton, Vermont.

Intercollegiate Student Symposium: April 1984, Castleton State College, Castleton, Vermont. Chairman: Dr. Jeffrey Willens, Assistant Academic Dean.

Year of Founding: 1965

Dues for Regular Members: 1982—$10; 1983—$10.

VIRGINIA ACADEMY OF SCIENCE

OFFICERS: May 15, 1983 through May 14, 1984.

Please note: Central Office Address—Department of Biology, Richmond, Virginia 23173.

*Executive Officer: Blanton M. Bruner, Central Office. Phone: (Office) 804-285-9624, (Home) 804-740-8303.

President: Harold M. Bell, Dept. of Chemistry, VPI&SU, Blacksburg, Va. 24061. Phone: 703-961-6689 (office).

President Elect: Frank Leftwich, Dept. of Biology, University of Richmond, Va. 23173. Phone: 804-285-6275 (Office).

Secretary: R. Gerald Bass, Dept. of Chemistry, Va. Commonwealth University, Richmond, Va. 23284. Phone: 804-257-1298 (Office).

Treasurer: Robert L. Duncan, A. H. Robins Co., 1407 Cumming Drive, Richmond, Va. 23229. Phone 804-257-2304 (Office).

Director, Junior Academy: R. Dean Decker, Dept. of Biology, University of Richmond, Richmond, Va. 23173.

Editor, Journal or Proceedings: Stewart A. Ware, Dept. of Biology, College of William and Mary, Williamsburg, Va. 23185.

Delegate to N.A.A.S.: Ertle Thompson, Ruffner Hall, University of Virginia, Charlottesville, Va. 22903. Phone: 804-924-3788 (Office).

ACTIVITIES

Membership: 1291

Sections: Agricultural Sciences; Astronomy, Mathematics and Physics; Microbiology, Biology; Chemistry; Materials Science; Engineering; Geology, Medical Sciences; Psychology; Education; Statistics; Space Science and Technology; Botany; Environmental Science.

School Students: Junior Academy ($4,500 in awards and stipends; Science Talent Search; Visiting Scientists Program (for high school and college students); recognition of outstanding students.

School Teachers: Recognition of outstanding teachers ($300); section of academy.

College Students: Recognition of outstanding students.

General Public: Museum; Science Advisory Committee to Governor; conservation of natural areas.

Members: Annual Meeting (May); symposia; field trips; research grants; cancer research grants; field research projects; recognition of outstanding members (Distinguished Service Award, Fellow); Horsley Research Award ($500).

Publications: Journal; Proceedings; Junior Academy Handbook and Bulletin.

Year of Founding: 1923.

Dues for regular members: 1981—$10.00; 1982—$15.00; 1983—$15.00.

*Continuous Appointment

WASHINGTON ACADEMY OF SCIENCES
(Washington, D.C.)

OFFICERS: June 1, 1983 to May 31, 1984

CENTRAL OFFICE ADDRESS: 1101 North Highland Street, Arlington, VA 22201. Phone: 703-276-9254

President: Dr. Jean K. Boek, National Graduate University, 1101 North Highland Street, Arlington, VA 22201. 703-527-4800

President-elect: Dr. Ralph I. Cole, 3431 Blair Road, Fall Church, VA 22041. 703-820-1646

Secretary: Dr. Elise Ann B. Brown, Food Supply and Inspection Service, U.S. Dept. of Agriculture, 300 12th Street, S.W., Annex Room 601, Washington, DC. 20250. 202-447-8093

Treasurer: Dr. Ronald W. Manderscheid, Division of Biometry and Epidemiology, Survey Systems Research Branch, National Institutes of Mental Health, Room 18-C-05, 5600 Fishers Lane, Rockville, MD 20857. 301-443-3343

Office Manager: Mr. Grover C. Sherlin (Past-President, 1973-1974)

Editor of the Journal: Dr. Irving Gray, Dept. of Biology, Georgetown University, Reiss Science Bldg., Room 406, Washington, DC 20057. 202-625-4126

Junior Academy Advisor: Mr. Matthew J. Cerroni, Cerro-tek, Ltd., Box 437, Vienna, VA 22180. 703-556-3079

Delegate to N.A.A.S.: Mrs. Marjorie R. Townsend, P.E., 3529 Tilden St., N.W. Washington, DC 20008. 202-966-2330. (Vice President for Systems Development, American Science and Technology Corporation)

ACTIVITIES

For Members: Annual awards dinner, annual business meeting (May), scientific achievement awards, monthly lectures (October thru May)

For General Public: Symposia, lectures (October thru May)

For School Students: Junior Academy, Joint Board on Science and Engineering Education, Science Talent Search, grants-in-aid

Publications: *Journal of the Washington Academy of Sciences,* Founded 1898

Membership: Approx. 840, Annual dues: Members, $20.00; Fellows, $25.00

Affiliates: 49 Scientific and Engineering Societies

WEST VIRGINIA ACADEMY OF SCIENCE

President: B. Das Sarma, Department of Chemistry, West Virginia State College Institute, W. Va. 25112. 304-766-3105.

Treasurer: Roy B. Clarkson, Department of Biology, West Virginia University, Morgantown, W. Va. 26506. 304-293-5201.

Membership Secretary: Betty Bartholomew, Department of Biology, West Virginia University, Morgantown, W. Va. 26506. 304-293-5201.

Recording Secretary: John A. Chisler, Department of Biology, Glenville State College, Glenville, W. Va. 26351. 304-462-7361.

Managing Editor: Edward C. Keller, Jr., Department of Biology, West Virginia University, Morgantown, W. Va. 25606. 304-293-5201.

Newsletter Editor: Karl Fezer, Department of Biology, Concord College, Athens, W. Va. 24712. 304-384-3115.

Library Subscription Secretary: John Warner, Department of Sociology, West Virginia Wesleyan College, Buckhannon, W. Va. 26201. 304-473-7011.

WVAS Junior Academy: David Wolfe and Joe Glencoe, West Virginia Wesleyan College, Buckhannon, W. Va. 26201. 304-473-8026.

Past Presidents: David F. Blaydes, Department of Biology, West Virginia University, Morgantown, W. Va. 26506. 304-293-5201
Robert G. Nunley, Department of Biology, University of Charleston, Charleston, W. Va. 25304. 304-346-9471.

WISCONSIN ACADEMY OF SCIENCES, ARTS AND LETTERS

OFFICERS: January 15, 1983 to January 15, 1984.

Please Note: Central Office address—1922 University Avenue, Madison, WI 53705.

Executive Officer: LeRoy R. Lee, Central Office. Phone: 608-263-1692.

President: Martha Peterson, One Langdon St., Madison, WI 53703; 608-258-8421.

President-Elect: Kenneth Dowling, 7974 Old Sauk Pass Rd., Cross Plains, WI 53528; 608-836-7165.

Vice-Presidents — Sciences: Koby T. Crabtree, UW-Center, Marathon Cnty Wausau, WI 54401; 715-845-9602. Arts: Letters: Michael Sherman, 206 N. Glenway, Madison, WI 53705; 608-233-0713.

Secretary/Treasurer: Robert Najem, Lowell Hall/UW, Madison, Madison, WI 53706; 608-262-1417.

Director, Junior Academy: LeRoy Lee, Central Office.

Editor, *Transactions:* Journal or Proceedings: Kathryn & Philip Whitford, 2647 N. Booth, Milwaukee, WI 53212; 414-264-2639.

Editor, *Wisconsin Academy Review:* Patricia Powell, Central Office.

Editor, Newsletter: Patricia Powell, Central Office.

Delegate to N.A.A.S.: LeRoy Lee, Central Office.

ACTIVITIES:

Membership: 1492.

Sections: Wisconsin Botanical Club; Wisconsin Phenological Society; Wisconsin Society of Science Teachers, Inc.: Wisconsin Fellowship of Poets; Nature Conservancy, Wisconsin Chapter; Wisconsin Regional Writers Assoc., Inc.; Forest History Association of Wisconsin, Inc.; Wildlife Society, Wisconsin Chapter; Wisconsin Art Education Assoc.; Wisconsin Dance Council; Wisconsin Speleological Society; Wisconsin Rural Artists Assoc., Inc.; Wisconsin Library Assoc.; Wisconsin Map Society; Wisconsin Entomological Society; Council for Wisconsin Writers; International Crane Foundation; Lincoln Fellowship; People to People, Wisconsin Chapter; Wisconsin Fine Arts Association; Wisconsin Folklore and Folklife Society; Wisconsin Heritages, Inc.; Wisconsin Theater Association; Wisconsin Archaeological Survey.

School Students: Junior Academy; West Virginia Youth Science Camp recommendation, administration of; science camps and field trips; regional workshops and seminars; summer courses in cooperation with state universities; environmental institutes for high school studetns. Administration of the Governor's Youth Awards (bravery, meritorious action and service); administration of Science World for Department of Public Instruction.

School Teachers: Formation of the Center for the Advancement of Science Education. Conducts conferences, workshops, etc.

General Public and Members: Provide advice to governmental units; conservation of natural areas; joint conference programming; business, scientific and cultural meetings; symposia; field trips; recognition of outstanding members and nonmembers.

Publications: Journal-*Transactions* (annual); *Academy Review* (quarterly magazine); *Inside the Academy* (bi-monthly newsletter). Junior Academy publication: *Excerpts* (creative writing, some photography).

Year of Founding: 1870.

Dues for regular members: 1983—$20.00, $27.00.

Other officers on file in NAAS Secretary's office.

HANDBOOK

CONSTITUTION OF THE NATIONAL ASSOCIATION OF ACADEMIES OF SCIENCE

Article I. PURPOSES

The purposes of the National Association of Academies of Science of the American Association for the Advancement of Science are (1) to provide an organization for the promotion through mutual cooperation of the common aims and purposes of the several state and municipal academies and of the American Association for the Advancement of Science; and (2) specifically, to provide appropriate means for consultation on an investigation of the problems of academies with a view to aiding all in their common purposes and their accomplishments.

Article II. MEETING

The meeting of the National Association of Academies of Science shall be held annually and shall be open to members as described herein and to interested guests.

Article III. MEMBERSHIP

Membership shall be composed of two representatives from each affiliated academy. One of these shall be the officially designated delegate to the Council of the American Association for the Advancement of Science; the other shall be an officer of the affiliated academy. In the event either or both of the above shall be unable to attend a meeting of the National Association of Academies of Science, the officers of the academy concerned may appoint duly accredited alternates. All National Association of Academies of Science delegates should be members in good standing in the American Association for the Advancement of Science.

Article IV. OFFICERS

The officers of the National Association of Academies of Science shall be (1) a president-elect, who shall serve for one year, following which he shall become president; (2) a president, who shall have served one year as president-elect, and whose term of office shall be one year; (3) a retiring president, whose term of office shall be one year following his retirement as president; (4) a secretary-treasurer, who may be continued in office by re-election not more than three years; (5) an Archivist who may be continued in office by re-election for an indefinite number of terms, and (6) a Director of the American Junior Academy of Science who shall be elected for a three-year term and who may be re-elected for an indefinite number of terms. The president-elect, the secretary-treasurer, and the archivist shall be elected at each annual meeting and the Director of the American Junior Academy of Science at every third annual meeting by a majority vote. Only members of the AAAS are eligible to hold office in the National Association of Academies of Science.

Article V. COMMITTEES

Section 1. Committee membership shall, as far as possible, be representative of the wide geographical distribution of the affiliated academies.

Section 2. There shall be an Executive Committee composed of the elected officers of the National Association of Academies of Science.

Section 3. A nominating committee shall be appointed by the president at a reasonable time before the annual meeting.

Section 4. A committee to sponsor the Junior Scientists Assembly shall be appointed by the president.

Section 5. Special committees shall be appointed by the president as the occasion may demand.

Article VI. AMENDMENTS

Section 1. Amendments to this Constitution may be proposed by majority vote of the Executive Committee or by majority vote of the members present at an annual meeting.

Section 2. The Constitution may be amended when the following requirements have been met: (1) the proposed amendment has been submitted to an annual meeting one year prior to the date on which action may be taken; and (2) the proposed amendment has been approved by a two-thirds vote of members voting at the time action is taken.

Article VII. STANDING COMMITTEES

Standing committees shall be appointed by the president subject to the approval of the Executive Committee. These standing committees shall be composed of three members with a rotating membership; one member being appointed to each committee each year. Standing committees are: Junior Academies, Collegiate Academies, and Program. The chairman of the Junior Academies committee shall be the elected Director of the American Junior Academy of Science.

BY-LAWS OF THE NATIONAL ASSOCIATION OF ACADEMIES OF SCIENCE

ARTICLE I
MEMBERSHIP AND DUES

Section 1. Any regional, state, or local academy of science (or organization with objectives that are comparable to those of the member academies of science) that is affiliated with the American Association for the Advancement of Science may become a member of the National Association of Academies of Science on approval of the Board of Directors and payment of the required dues.

Section 2. Each member organization may designate two representatives, both of whom are members in good standing of the American Association for the Advancement of Science, who shall serve as delegates to the Assembly of Delegates.

Section 3. The annual dues for member organizations shall be recommended by the Board of Directors and approved by majority vote of the delegates voting at any Assembly of Delegates at which a quorum is present.

ARTICLE II
OFFICERS: ELECTION AND DUTIES

Section 1. The officers of the National Association of Academies of Science shall be the President-elect, the President, the Immediate Past-president, the Secretary, the Treasurer, the Archivist, the Director of the American Junior Academy of Science. Two delegates to the council of the American Association for the Advancement of Science, if not already among the aforementioned officers, shall be considered additional officers of the Association.

Section 2. All officers of the Association shall be elected by majority vote of the delegates voting at the annual meeting of the Assembly of Delegates. The President-elect, the Secretary, and the Archivist shall be elected annually for one-year terms. The Secretary may serve continuously by re-election for not more than three years. The Archivist may be re-elected for an indefinite number of terms. The President-elect shall serve one year as such before becoming President, serving one year in that office and then one year as Immediate Past-president. A Treasurer shall be elected every third year and may not succeed himself in office by re-election. The Director of the American Junior Academy of Science shall be elected for an indefinite number of terms. Each delegate to the Council of the American Association for the Advancement of Science shall be elected to a three-year term with only one to be elected in a given year.

Section 3. Newly-elected officers shall assume office immediately following adjournment of the last session of the annual meeting at which they were elected. These officers shall continue to serve until replacements are duly elected. If the annual meeting is not held or a quorum is not present, the Board of directors may conduct an election by mail ballot. Any officer other than the President who is unable to complete his term of office by virtue of resignation, disability, or death, shall be replaced for the balance of the term by election by the Board of Directors.

Section 4. Only members of the American Association for the Advancement of Science shall be eligible to hold office in the National Association of Academies of Science.

Section 5. Duties.

5a. The President shall appoint all committees with Board of Directors' approval, preside at all meetings of the Association and of the Board of Directors, and perform such other duties as ordinarily pertain to the office. The President shall be an ex-officio member of all committees except the Nominating Committee.

5b. The Immediate Past-president shall chair the Nominating Committee and the Annual Program Committee. He shall prepare and arrange for all sessions of the annual meeting, except those of the Junior Academy, and act as liaison with AAAS Meetings Office and the Association Secretary.

5c. The President-elect shall familiarize himself with all Association affairs in preparation for assuming the presidency, working under and in cooperation with the President. In the event of the death or resignation of the President during his term, the President-elect will thereupon become President for the remainder of the unexpired term and for the term for which he was originally elected.

5d. The Secretary shall record attendance at meetings of the Association and the Board of Directors; record and preserve the minutes of such meetings; make a report of all such meetings to the membership; notify officers and committee members of their appointments and furnish committees with all papers referred to them; prepare the Proceedings of the Association; conduct the correspondence of the Association; and perform such other duties as customarily pertain to the office.

5e. The Treasurer shall be responsible for the collection, disbursement, and custody of all Association monies, accounting for the same to the Association at its annual meetings and at each meeting of the Board of Directors or at other times upon request of the Board of Directors, and shall perform such other duties as customarily pertain to the office.

5f. The Archivist shall be responsible for the preservation, filing, and storage of all records and publications of the Association. The Archivist shall assume responsibility for recording a history of all changes made to the constitution, bylaws, and articles of incorporation and shall provide an up-to-date copy of these documents for inclusion in the Directory and Proceedings.

5g. The Director of the American Junior Academy of Science shall direct the preparation and arrangements for the annual meeting of the American Junior Academy of

Science and shall serve as chairman of the Junior Academies committee as an ex-officio member of the Annual Program Committee.

ARTICLE III
BOARD OF DIRECTORS

Section 1. The Association shall have a Board of Directors which shall be the legal representative of the Association, having control and management of its affairs and funds and acting as its administrative body.

Section 2. The Board of Directors shall consist of the elected officers of the Association and two members of the staff of the American Association for the Advancement of Science ex-officio.

Section 3. The Board of Directors shall meet at least twice per year with staff of the American Association for the Advancement of Science or on call of the President or at written request of a majority of its members.

Section 4. The function of the Board of Directors shall be to (a) administer the affairs of the Association; (b) control and manage the funds and other property of the Association and exercise general oversight of all business matters affecting the Association; (c) designate banks to be used as depositories of Association funds and authorize necessary bonding of officers; (d) review the budget as submitted by the Finance Committee and submit its recommendations to the Assembly of Delegates; (e) approve the appointments to standing committees by the President and act upon their reports; (f) receive, or refer to the appropriate bodies, the review of applications and the establishment of membership dues and privileges for members of the Association; and (g) with the exception of the office of President, fill a vacancy in the Board of Directors or in any appointed office.

Section 5. A quorum of the Board of Directors shall consist of a majority thereof. The action of a majority of the Directors present at a meeting at which there is a quorum shall be construed as action of the Board of Directors.

Section 6. The Board of Directors may employ appropriate full or part-time workers to effectuate the purposes of the Association; however, no elected officer of the Association may receive compensation for services rendered.

ARTICLE IV
ASSEMBLY OF DELEGATES

Section 1. The Association shall have an Assembly of Delegates which shall act as its policy-making body and have such other duties as may be prescribed in the Bylaws.

Section 2. The Assembly of Delegates shall consist of not more than two representatives of each member organization and the elected officers and past-presidents of the Association. Each delegate shall have equal voting rights; a delegate eligible as a delegate in more than one capacity shall have only one vote. No member organization shall have more than two votes.

Section 3. The Assembly of Delegates shall meet annually at the time of the annual meeting of the Association and shall take necessary action by mail ballot during the year. Delegates representing twenty percent or more of the member organizations shall constitute a quorum.

Section 4. The function of the Assembly of Delegates shall be to (a) transact business as may properly come before it, including recommendations of an action upon major policy decisions affecting the future of the association; (b) receive and act upon reports of officers, the Board of Directors, and committees; (c) adopt an annual budget, program of work, and resolutions; (d) act upon proposed changes in the Bylaws and the Articles of Incorporation; and (e) elect the officers of the Association.

ARTICLE V
COMMITTEES

Section 1. The Association shall have the following standing committees: the Junior Academies Committee, the Program Committee, the Nominating Committee, and Recognition and Awards Committee, which shall each consist of three members with rotating membership, one member being appointed to each committee each year.

Section 2. Special committees may be appointed by the President with the approval of the Board of Directors as the occasion may demand.

Section 3. The President shall appoint all committees with Board of Directors' approval. Committee membership shall, to the extent possible, be representative of the wide geographical distribution of the member organizations.

ARTICLE VI
PUBLICATIONS

Section 1. The Association shall publish the Directory and Proceedings of the National Association of the Academies of Science annually and may publish other items occasionally that are intended for Association use and benefit. An Association newsletter may be published and distributed at the discretion of the President or the Board.

ARTICLE VII
RECOGNITION AND AWARDS

Section 1. The Association may select individuals, groups, or institutions for special recognition and commendation for distinguished service in meeting the objectives of the Association.

ARTICLE VIII
ANNUAL MEETING

The Annual Meeting of the National Association of Academies of Science shall be held with the annual meeting of the American Association for the Advancement of Science and shall be open to members as described herein and to interested guests.

ARTICLE IX
AMENDMENTS

Section 1. These Bylaws may be amended by a two-thirds vote of the delegates voting at any meeting of the Assembly of Delegates at which a quorum is present. No amendments or additions to these Bylaws shall be made that are not in conformity with the Articles of Incorporation.

Section 2. Amendments to the Articles of Incorporation may be proposed by majority vote of the Board of Directors or by majority vote of the delegates present at any annual meeting of the assembly of Delegates at which a quorum is present. The Articles of Incorporation may be amended if (1) the proposed amendment has been submitted at an annual meeting one year prior to the date on which action may be taken; and (2) the proposed amendment has been approved by a two-thirds vote of the delegates voting at the time action is taken.

ARTICLE X
TAX-EXEMPT STATUS

Section 1. The association is non-stock and non-profit. No part of the net earnings of the Association shall inure to the benefit of, or be distributable to, its directors, officers, or other private persons, except that the Association shall be authorized or empowered to pay reasonable compensation for services rendered and to make payments and distributions in futherance of the objectives set forth in Article III of the Articles of Incorporation. No substantial part of the activities of the Association shall be the carrying on of propaganda, or otherwise attempting to influence legislation, and the Association shall not participate in, or intervene in, any political campaign on behalf of any candidate for public office. Notwithstanding any of the provisions of the Articles of Incorporation, the Association shall not carry on any other activities not permitted to be carried on (a) by a corporation exempt from Federal income tax under Section 501(a)(2) of the Internal Revenue Code of 1954 (or the corresponding provision of any future United States Internal Revenue Law) or (b) by a corporation, contributions to which are deductible under Section 170(c)2 or the Internal Revenue Code of 1954 (or the corresponding provision of any future United States Internal Revenue Law).

Section 2. If in any one year the Association is found to be a private foundation, then and in that event, its income for each such taxable year shall be distributed at such time and in such manner as not to subject the foundation to tax under Section 4942 of the Internal Revenue Code, and the foundation shall not engage in any act of self-dealing (as defined in Section 4941(d) of the Internal Revenue Code), and shall not retain any excess business holdings (as defined in Section 4943(d) of the Internal Revenue Code), and shall not make any investments in such manner as to subject the foundation to tax under Section 4944 of the Internal Revenue Code, and shall not make any taxable expenditures (as defined in Section 4945(d) of the Internal Revenue Code).

ARTICLE XI
DISSOLUTION

Section 1. In the event of dissolution or termination of the Association, the Board shall, after the payment of all the liabilities of the Association, dispose of all of the assets of the Association exclusively for charitable, educational, religious, or scientific purposes as shall at the time qualify as an exempt organization or organizations under Section 501(a)(2) of the Internal Revenue Code of 1954 (or the corresponding provision of any future United States Internal Revenue Law) as the Board shall determine. Any of such assets not so disposed of shall be disposed of by the Court of proper jurisdiction, exclusively for such purposes or to such organization of organizations as said court shall determine, which are organized and operated exclusively for such purposes.

ARTICLES OF AMENDMENT, TO THE ARTICLES OF INCORPORATION OF NATIONAL ASSOCIATION OF ACADEMIES OF SCIENCE

To: The Recorder of Deeds, D.C.
Washington, D.C.

Pursuant to the provisions of the District of Columbia Non-Profit Corporation Act, the undersigned adopts the following Articles of Amendment to its Articles of Incorporation:

FIRST: The name of the corporation is National Association of Academies of Science.

SECOND: The following amendments to the Articles of Incorporation were adopted by the Corporation in the manner prescribed by the District of Columbia Non-Profit Corporation Act:

THIRD: The purposes for which the Corporation (hereinafter the "ASSOCIATION") is organized and operated are exclusively scientific and educational as defined in § 501(c)(3) of the Internal Review Code as they now exist or as they may hereafter be amended. The ASSOCIATION shall provide an organization for the promotion through mutual cooperation of the common aims and purposes of the several regional, state and municipal academies of the American Association for the Advancement of Science and shall provide appropriate means for consultation on and investigation of their problems. The ASSOCIATION shall promote scientific interest, inquiry and education by meetings, projects, papers, reports, discussions and professional contacts, thereby fostering public welfare and education.

ELEVENTH: (1) The ASSOCIATION is non-stock and non-profit. No part of the net earings of the ASSOCIATION shall inure to the benefit of, or be distributable to, its directors, officers, or other private persons, except that the ASSOCIATION shall be authorized or empowered to pay reasonable compensation for services rendered and to make payments and distributions in futherance of the objectives set forth in Article III of the Articles of Incorporation. No substantial part of the activities of the ASSOCIATION shall be the carrying on on propaganda, or otherwise attempting to influence legislation, and the ASSOCIATION shall not participate in, or intervene in, any political campaign on behalf of any candidate for public office. Notwithstanding any of the provisions of the Articles of Incorporation, the ASSOCIATION shall not carry on any other activities not permitted to be carried on (a) by a corporation exempt from Federal income tax under § 501(c)(3) of the Internal Revenue Code of 1954 (or the corresponding provision of any future United States Internal Revenue Law) or (b) by a corporation, contributions to which are deductible under § 170(c)(2) of the Internal Revenue Code of 1954 (or the corresponding provision of).

(2) If in any one year the ASSOCIATION is found to be a private foundation, then and in that event, its income for each such taxable year shall be distributed at such time and in such manner as not to subject the foundation to tax under § 4942 of the Internal Revenue Code, and the foundation shall not engage in any act of self-dealing [as defined in § 4943 (c) of the Internal Revenue Code], and shall not make any investments in such manner as to subject the foundations to tax under § 4944 of the Internal Revenue Code, and shall not make any taxable expenditures [as defined in § 4945(d) of the Internal Revenue Code].

TWELFTH: In the event of dissolution or termination of the ASSOCIATION, the Board shall, after the payment of all of the liabilities of the ASSOCIATION, dispose of all of the assets of the ASSOCIATION exclusively for the objectives of the ASSOCIATION, in such manner, or to such organization or organizations organized exclusively for charitable, education, religious, or scientific purposes as shall at the time qualify as an exempt organization or organizations under § 501 (c)(3) of the Internal Revenue Code of 1954 (or the corresponding provision of any future United States Internal Revenue Law) as the Board shall determine. Any of such assets not so disposed of shall be disposed of by the Court of proper jurisdiction, exclusively for such purposes or to such organization or organizations as said Court shall determine, which are organized and operated exclusively for such purposes.

THIRD: The amendments were adopted at a meeting of the members held on February 26, 1974, at which a quorum was present, and the amendments received at least two-thirds of the votes which members present or represented by proxy at such meeting were entitled to cast.

DATE: March 1, 1974

National Association of Academies of Science

By ______________________________

Dr. Charles E. DePoe, President

ATTEST:

____

Dr. Richard J. Raridon, Secretary

Note: Amended by name change January, 1979.

MEETING LOCATIONS AND PRESIDENTS, NAAS

Year	*Location of Meeting*	*President*
1926	Philadelphia, PA	W. H. Alexander (OH)
1927	Nashville, TN	W. H. Alexander (OH)
1928	New York, NY	W. H. Alexander (OH)
1929	Des Moines, IA	H. E. Enders (IN)
1930	Cleveland, OH	D. W. Morehouse (IA)
1931	New Orleans, LA	Chancey Juday (WI)
1932	Atlantic City, NJ	A. C. Walton (IL)
1933	Boston, MA	H. E. Enders (IN)
1934	Pittsburgh, PA	H. B. Carmichael (AL)
1935	St. Louis, MO	W. H. Alexander (OH)
1936	Atlantic City, NJ	W. H. Alexander (OH)
1937	Indianapolis, IN	W. H. Alexander (OH)
1938	Richmond, VA	E. C. L. Miller (VA)
1939	Columbus, OH	B. Cunningham (VA)
1940	Philadelphia, PA	P. D. Straushaugh (WV)
1941	Dallas, TX	P. D. Straushaugh (WV)
1942, 1943	No meeting	P. D. Straushaugh (WV)
1944	Cleveland, OH	P. D. Straushaugh (WV)
1945	St. Louis, MO	P. D. Straushaugh (WV)
1946	Boston, MA	H. H. Michud (IA)
1948	Washington, DC	A. O. Weese (OK)
1949	New York, NY	F. E. E. Germann (CO)
1950	Cleveland, OH	B. Harshbarger (VA)
1951	Philadelphia, PA	C. L. Baker (TN)
1952	St. Louis, MO	A. R. Middleton (KY)
1953	Boston, MA	P. Robertson (IL)
1954	Berkeley, CA	Wayne Taylor (TX)
1955	Atlanta, GA	Leland H. Taylor (WV)
1956	New York, NY	P. H. Yancey (AL)
1957	Indianapolis, IN	Thelma C. Heatwole (VA)
1958	Washington, DC	John A Yarbrough (NC)
1959	Chicago, IL	A. M. Winchester
1960	New York, NY	J. G. Arnold (New Orleans)
1961	Denver, CO	Robert C. Miller (CA)
1962	Philadelphia, PA	R. Ruffin Jones (FL)
1963	Cleveland, OH	G. Gerald Acker (OH)
1964	Montreal, CANADA	J. Teague Self (OK)
1965	Berkeley, CA	Karlem Riess (New Orleans)
1966	Washington, DC	J. A. Rutledge (NB)
1967	New York, NY	V. Elving Anderson (MN)
1968	Dallas, TX	John H. Melvin (OH)
1969	Boston, MA	Harry J. Bennett (LA)

1970	Chicago, IL	Wilmer W. Tanner (UT)
1971	Philadelphia, PA	Glenn W. Steward (New England)
1972	Washington, DC	Charles M. Vaughn (OH)
1973	No Meeting	Charles E. DePoe (LA)
1974	San Francisco, CA	Franz H. Rathman (ND)
1975	New York, NY	Lauren C. Gilman (FL)
1976	Boston, MA	Lora Magnum Shields (NM)
1977	Denver, CO	Richard Raridon (TN)
1978	Washington, DC	James R. Batt (WI)
1979	Houston, TX	Everett Wisman (VA)
1980	San Francisco, CA	Robert Hanson (IA)
1981	Toronto, CANADA	George C. Shoffstall (PA)
1982	Washington, DC	Frank W. Starr (IA)
1983	Detroit, MI	Lee N. Bolen (MS)

Message to Members Academies of Science:

Each member Academy of Science is greatly encouraged to send a delegate and, hopefully, alternates to the NAAS/AJAS/AAAS annual meeting in New York City, May, 1984. Contact with other delegates can be established by visiting the NAAS booth, by using the AAAS message board and by attending the NAAS meetings. By sharing our problems and our victories we can find many ways to enrich the programs of each of our Academies.

Should you also happen to send a van load of your best Junior Academy members to New York City they will have the opportunity to enjoy one of the most outstanding and interesting programs available to our youth.

The challenge to you is to take full advantage of these unequalled opportunities to enhance your life and your Academy's activities. For housing and registration forms watch for the specific issues of *Science,* and for AJAS information write to the AJAS director or AJAS Committee Members (see NAAS Board of Directors and NAAS Committees listed in the book).

PURPOSE AND ACTIVITIES OF THE NATIONAL ASSOCIATION OF ACADEMIES OF SCIENCE

THE ASSOCIATION

The National Association of Academies of Science [NAAS] is an alliance of science academies affiliated with the American Association for the Advancement of Science [AAAS].

PURPOSE

The purpose of the **Association** is to promote the aims and purposes of member academies and of the AAAS. The **Association** also serves as a common meeting ground for consultation and investigation of problems of academies to aid all in achieving their objectives.

ANNUAL MEETING

The Association meets annually with the AAAS to transact business and to hold a conference on a topic of mutual interest. Also, the **Association** sponsors the national meeting of the **American Junior Academy of Science.** This program enables each member academy to send youth delegates for paper presentations, workshops, tours, meetings with eminent scientists, and a banquet. With assistance from AAAS, the **Association** sponsors a booth in the exhibit area to provide information on programs, publications and activities of member academies.

SUPPORT

Affiliated academies annually contribute 10¢ per individual member. Officers listed in the *Handbook and Directory* receive all publications without charge. The AAAS supports meetings of the Board of Directors and related expenses.

The **NAAS** is a nonprofit corporation classified by the Internal Revenue Service as 501(c)(3). Contributions are deductible for income tax purposes.

SCIENCE ACADEMIES

- **Generally embrace** all the scientific disciplines.
- **Facilitate collaboration** among academic and industrial scientists.
- **Provide youth science** programs (junior academies, science fairs, science congresses, visiting scientists).

- **Conduct meetings** for presentation of scholarly scientific reports, reviews, and research papers.
- **Have active publication programs.**
- **Provide science advice** to governmental agencies and community groups.
- **Improve science education,** through work with boards of education, school personnel, and accrediting agencies.
- **Promote public understanding of science,** through special lectures, public exhibits, and the support of museums.
- **Participate in political and social concerns** on matters involving scientific explanation or interpretation.
- **Help implement AAAS programs** at the state and local level.

PUBLICATIONS

The annual *Directory and Handbook* is the most-up-to-date source of information available on officers, membership, programs, activities and publications of each member academy. *It is an invaluable reference for librarians, researchers, science educators, and government personnel who need access to the grass-roots leadership of this Nation's scientific community.*

The *Proceedings* is a record of the **Association's** annual meeting including special symposia, presidential address and abstracts of American Junior Academy of Science papers. Recent issues with *special symposia* include:

- *Solutions to Problems Encountered in Running An Academy of Science*
- *The Future of Scientific Communications and Academies of Science*
- *How Academies of Science Can Communicate Science to the General Public*
- *Rational Use of Scientific and Technical Manpower*
- *Problems and Progress in Scientific and Technical Advising for Policy Formulation at the State Level*

Other publications include:

- *History of the Association: 1926-1970*
- *History of the Association: 1970-1976*
- *A Workbook for Journal Editors*
- *Newsletter*

INFORMATION

Please send me information about the ______________ Academy of Science.

Name ____

Street ______________________________ Apt. No. ________

City ______________ State ______________ Zip ________

Check ____________ membership ____________ annual meeting

________ Junior Academy ________ publications ________ other

(use address below)

PUBLICATION ORDER

Please send me the following publications:

________ Current Annual *Proceedings, Directory and Handbook* @ $15.00

________ Past Annual *Proceedings, Directory and Handbook* @ $10.00

________ Special Symposia (List) @$5.00

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________ *Handbook for Journal Editors* (no charge)

________ *History of the Association 1926-70* (no charge)

________ *History of the Association 1970-76* (no charge)

________ *Newsletter* (no charge)

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Please make checks payable to the National Association of Academies of Science.

Mail requests to NAAS, 445 King Avenue, Columbus, Ohio 43201.

National Association of Academies of Science

BOARD OF DIRECTORS, 1983-84

President: Dr. Lee N. Bolen, Physics Department, University of Mississippi, University, MS 38677. (601) 232-5401 (office); (601) 234-6134 (home).

President-Elect: Dr. Dean Rosebery, Science Division NEMSU, Kirksville, MO 63501. (816) 785-4599 (office); (816) 665-4193 (home).

Past President: Mr. Frank W. Starr, Science Coordinator, Waterloo Community Schools, 1516 Washington St., Waterloo, IA 50702. (319) 233-5281 (office); (319) 266-4768 (home).

Secretary: Dr. Shyamal K. Majumdar, Department of Biology, Lafayette College, Easton, PA 18042. (215) 250-5464 (office); (215) 258-8445 (home).

Treasurer: Dr. Ertle Thompson, Ruffner Hall, University of Virginia; Charlottesville, VA 22903. (804) 924-0840 (office)

Archivist: Mr. Lynn E. Elfner, The Ohio Academy of Science, 445 King Ave., Columbus, OH 43201. (614) 424-6045 (office); (614) 363-2244 (home).

Director, AJAS: Mrs. Dallas W. Cocke, The Collegiate Schools, N. Mooreland Road, Richmond, VA 23229. (804) 740-7077 (office); (804) 282-5719 (home).

Delegates to AAAS Council: Dr. Robert W. Hanson, Department of Chemistry, University of Northern Iowa, Cedar Falls, IA 50613. (319) 273-2022 (office); (319) 266-8245 (home).

Dr. George C. Shoffstall, West Penn Hospital, 4800 Friendship Ave., Pittsburgh, PA 15224. (412) 578-6884 (office); (412) 441-0455 (home).

AAAS Representatives: Dr. Joseph M. Dasbach, Office of Science Education, AAAS, 1776 Massachusetts Avenue, NW, Washington, DC 20036. (202) 467-4464 (office).

THE PROCEEDINGS, DIRECTORY, AND HANDBOOK OF THE NATIONAL ASSOCIATION OF ACADEMIES OF SCIENCE

1983 - 1984

TABLE OF CONTENTS

Page

Foreword: Lee N. Bolen, President, NAAS 5

National Association of Academies of Science, Board of Directors, 1983-84 6

NAAS, Committees, 1983 - 1984 7

1983 Distinguished Service Award to Dr. Joseph M. Dasbach 8

Distinguished Service Awards (1962- 1983) 9

Symposium: The Crises in Science and Mathematics Education: Perspectives from National, State, and Local Levels—Arranged and Presided by George C. Shoffstall

Introduction - George C. Shoffstall, West Penn Hospital, Pittsburgh, PA 11

Federalism and Its Impact on NSF Grants and the Training of Teachers. Ertle Thompson, Univ. of Va., Charlottesville, VA 12

Science Crisis in Michigan: Myth or Reality. Laurel A. Grotzinger, West Mich. Univ., Kalamazoo, MI 17

Impact of the New Federalism in Pennsylvania. John J. McDermott, Dept. of Educ., Harrisburg, PA 26

The Crisis in Science and Mathematics Education: How Indiana is Coping. Walter Cory, Ind. Univ., Bloomington, IN 31

The Crisis in Science Education: A Mississippi Perspective. Dudley F. Peeler, Jr., Univ. of Miss., Jackson, MS 38

Goals for Science Education. Anna J. Harrison, President-Elect, AAAS, Mount Holyoke College, South Hadley, MA 45

The Crisis in Science Education: An Overview. (Abstract only). F. James Rutherford, Chief Education Officer, AAAS, Washington, DC 48

Minutes, NAAS Board Meetings 49

American Junior Academy of Science 71

Directory of Member Academies and Their Activities 1983-1984 89

Handbook 131

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